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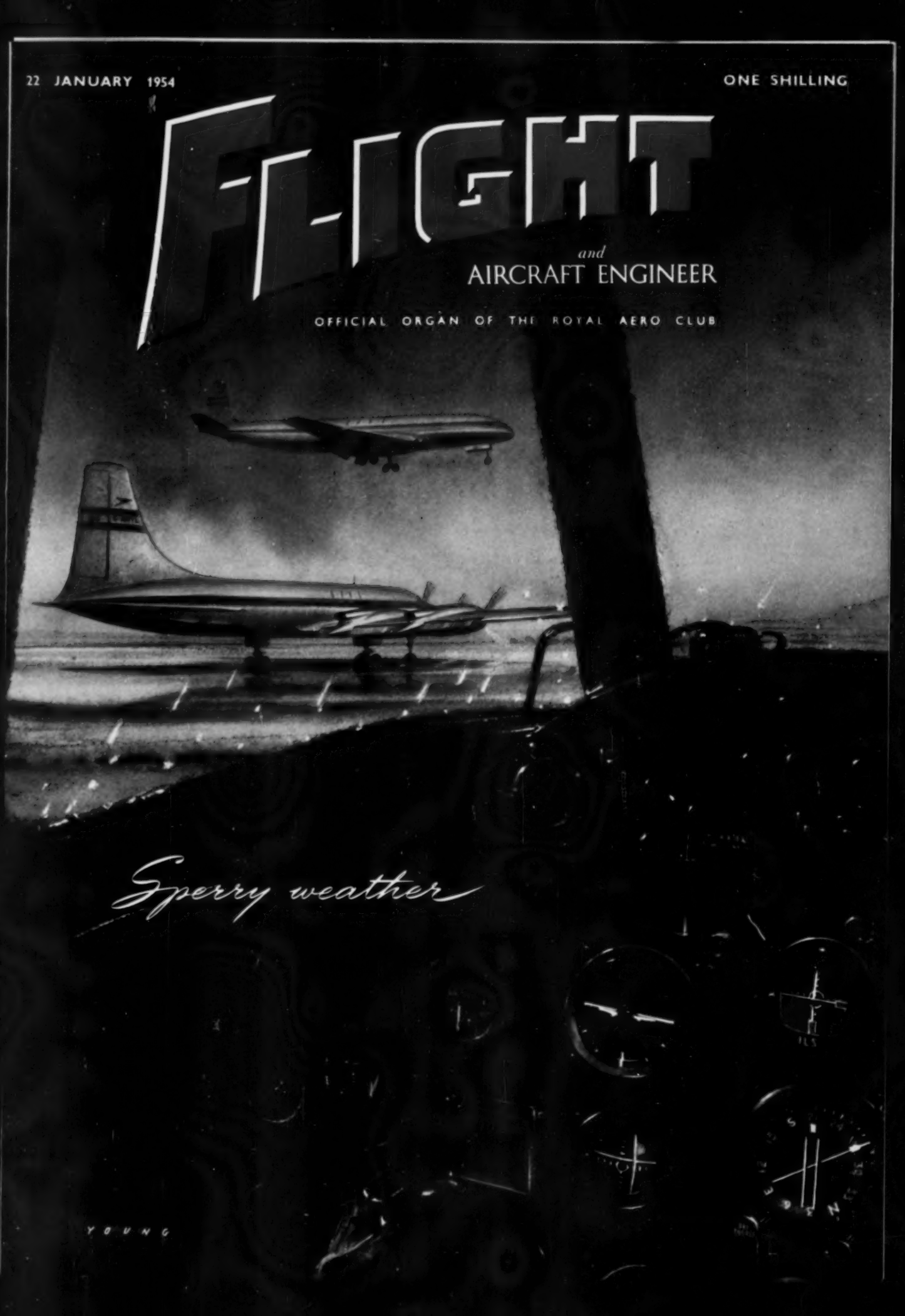

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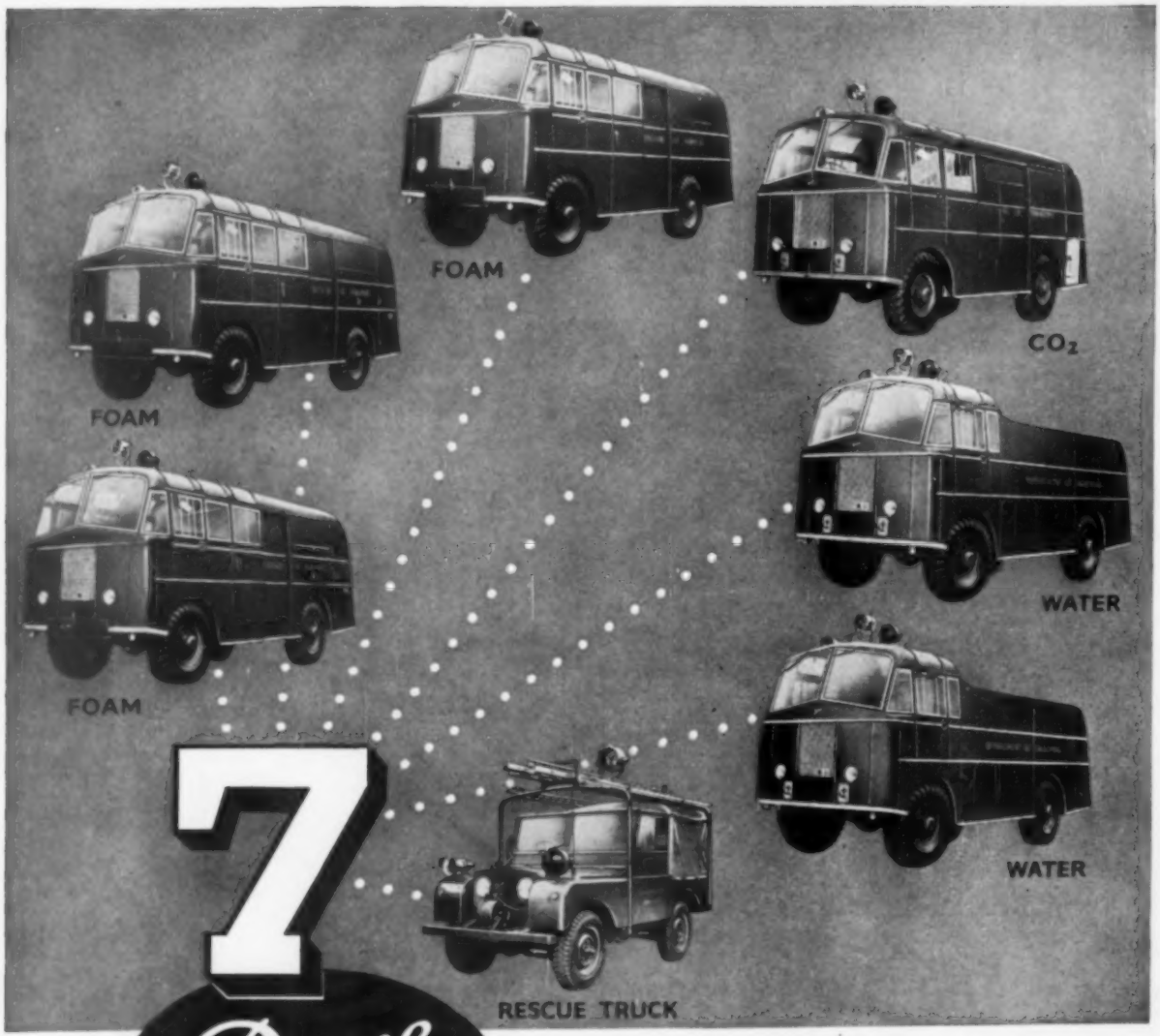

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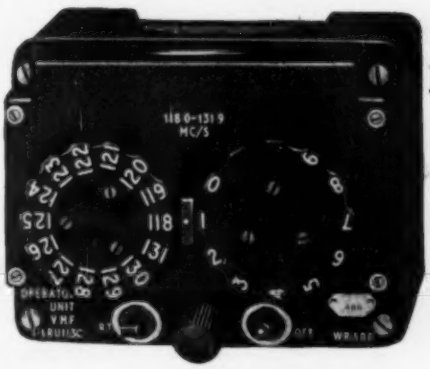

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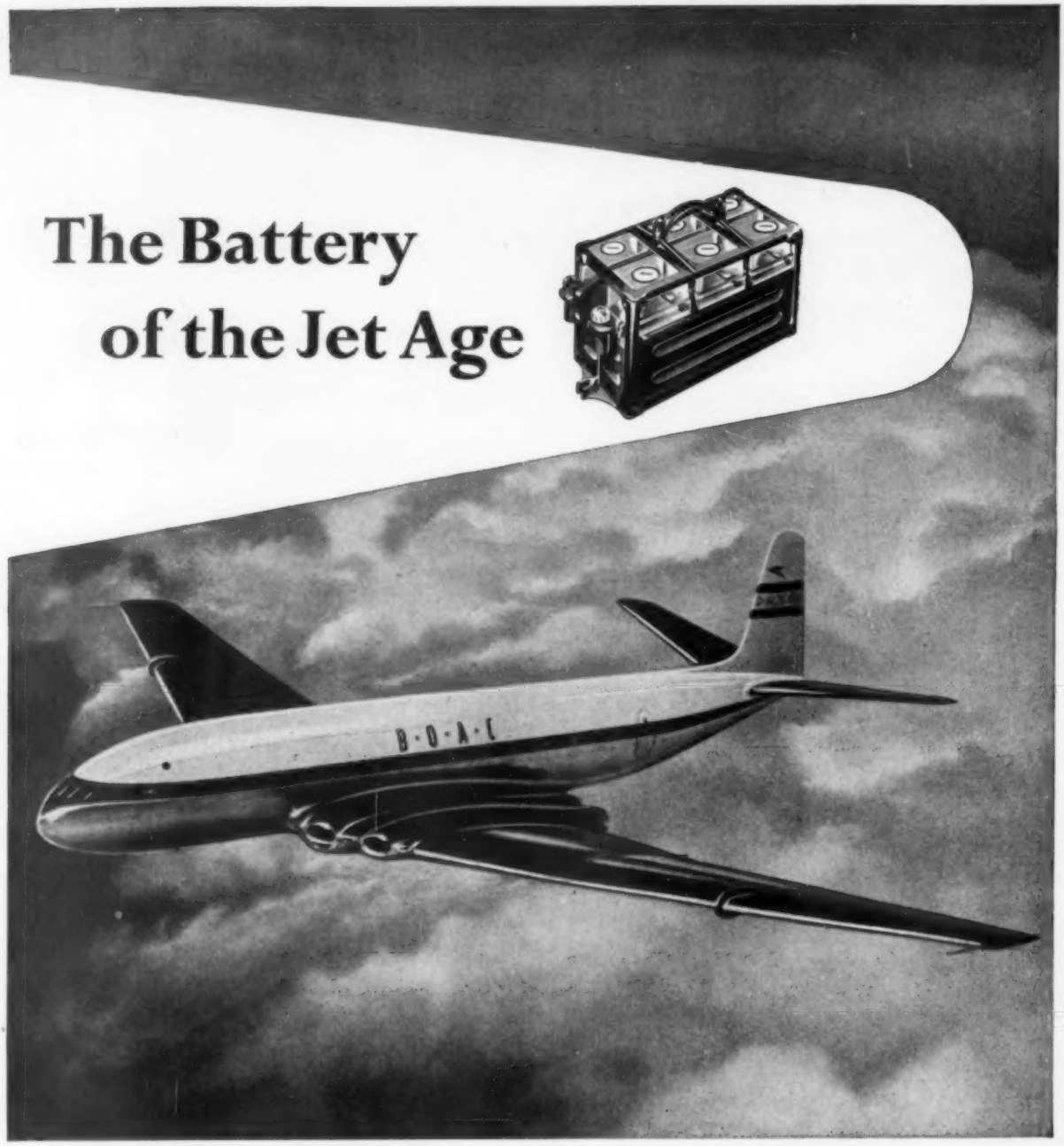

P.R.16

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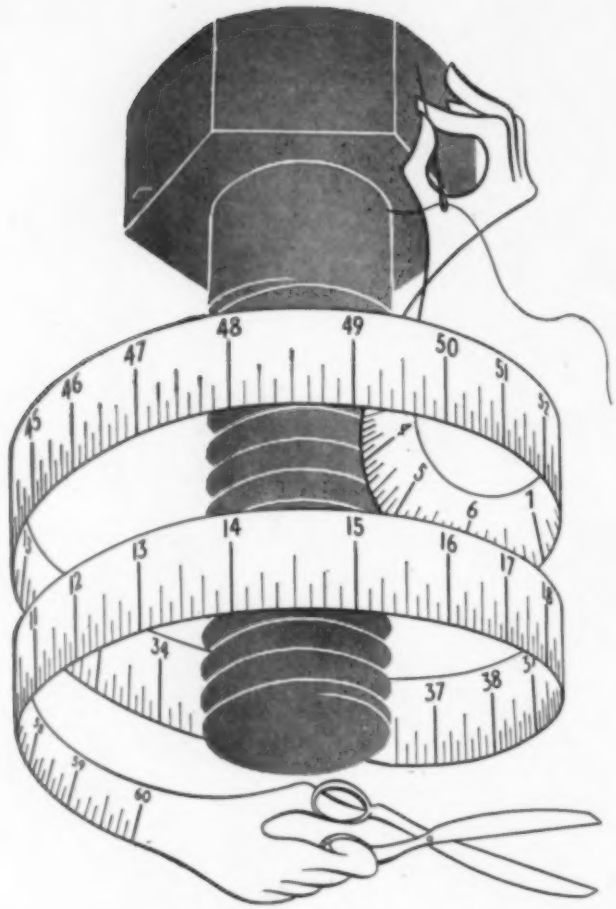

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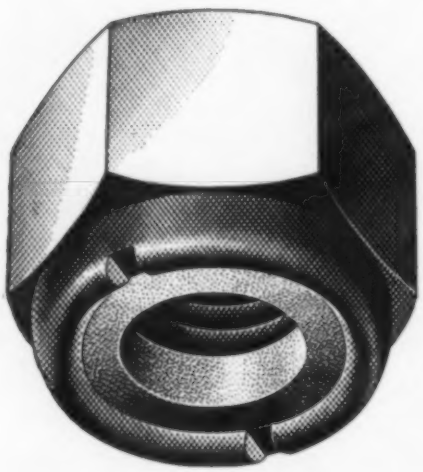

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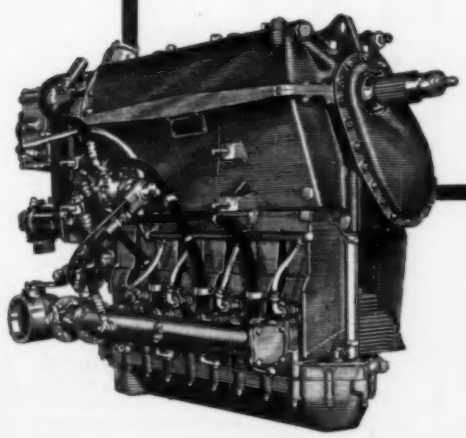

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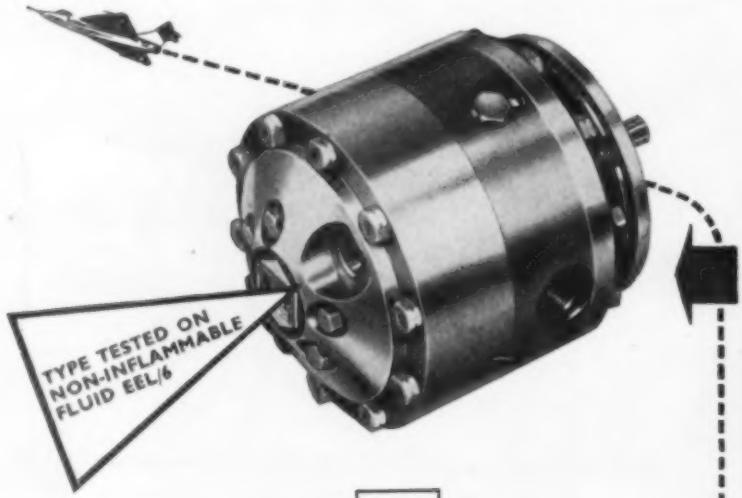

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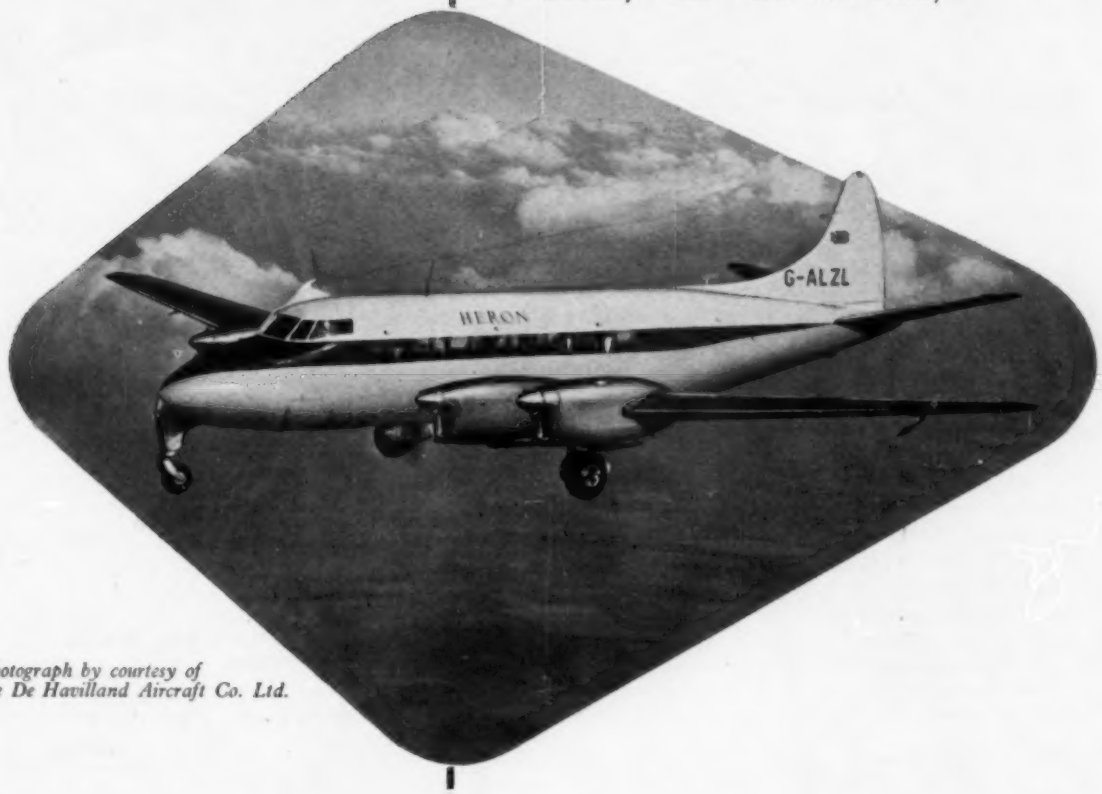

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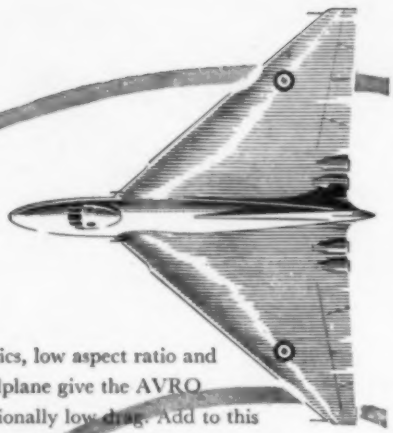

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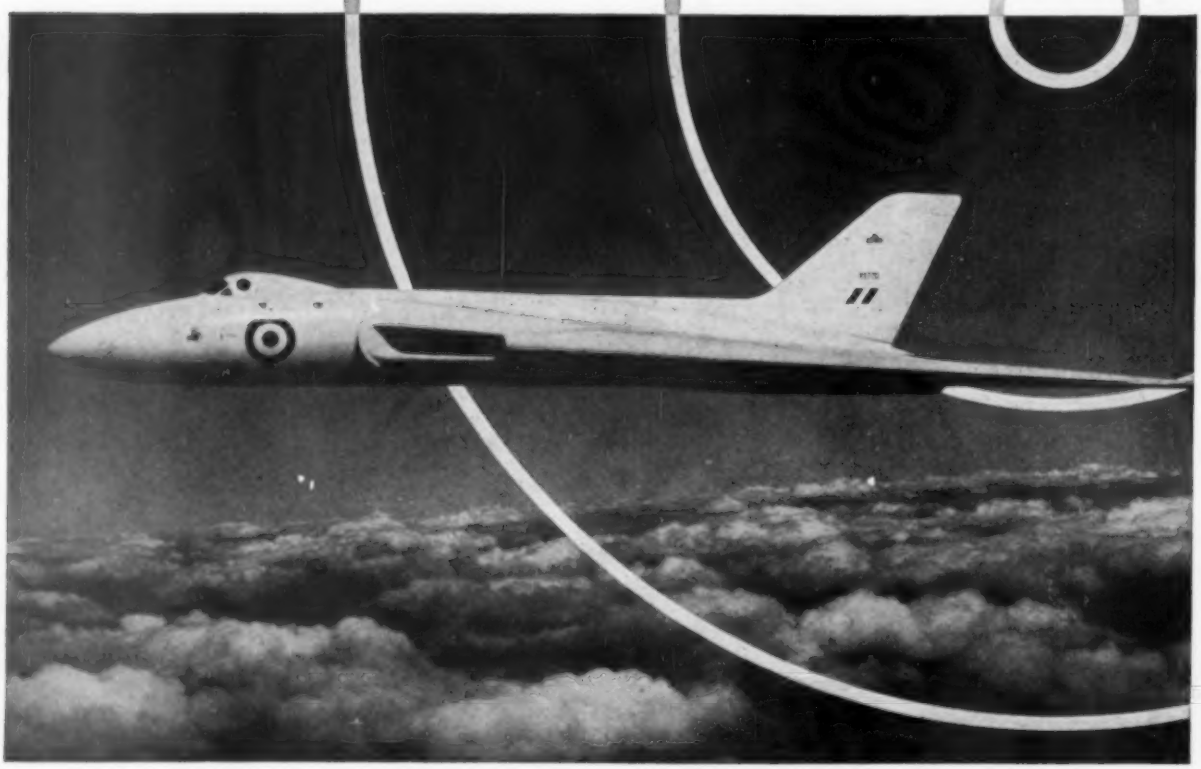

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Historic Aircraft: The Crucial Moment

THE first step is often the most difficult one to take. We are hopeful that the purchase of the R. G. J. Nash private collection of early flying machines will be a start from which much more will spring in the future. The importance of the plan to acquire these machines—a decision upon which the Council of the Royal Aeronautical Society are to be congratulated—is that a nucleus of a national collection is thus formed. We have for some time advocated such a move, explored possibilities and pleaded, as an interim measure, for the preservation of historic aircraft wherever they may be. Eight irreplaceable veterans, privately collected and cherished, are now assured of continued careful preservation; around them we hope and believe will be collected others.

Obviously, a collection of this kind must not be allowed to become merely a hoard. Selection should be an honour accorded only to the most outstanding aircraft (and engines), and means of exhibition and, in some cases perhaps, occasional demonstration, should be sought. The care, maintenance and housing of the machines and others which may join them will, however, present a problem and involve expense.

The Royal Aeronautical Society has, we believe, a certain responsibility to both the aircraft and to the younger generations of airmen who will wish to see and wonder at the strange devices from which have sprung, and will spring, the weapons and carriages of each succeeding decade. But while this responsibility could be in no better hands, such work of preservation is not among the primary objects of the R.Ae.S., nor has the Society hitherto been regarded as equipped to preserve aircraft. On the occasions of its annual garden parties it has certainly presented some of them, statically or in flight, in an admirable manner with the co-operation of the owners and generous assistance from various aircraft companies.

Many of the problems surrounding the establishment of a national aircraft collection, and some possible solutions as well, are discussed in an article on page 91. The extent of the work which the Society can undertake following its first welcome step will depend to a large extent on the help and co-operation it receives from the Air Ministry and the companies in the aircraft industry.

For various reasons—lack of storage space, absence of owners or others responsible, and, of course, enemy action—a depressingly large number of outstanding veterans were destroyed or otherwise lost between 1939 and 1945. Lately a greater sense of responsibility and affection for "old crocks" has sprung up again. But there has been little co-ordination of effort and funds have been short. Several organizations and individuals are interested, and the R.Ae.S. might find that a meeting called to discuss the possibilities of a national aircraft collection would produce worth-while results and offers.

Future generations will have cause to be grateful for the lead now given, particularly if, as we hope, it directly or indirectly brings about the better preservation of outstanding machines of each period and a greater sense of responsibility towards our tangible aircraft heritage.

A Place for Models

We have been asked if exhibition space could possibly be found for anything like a representative collection of aircraft, and also how gaps in the ranks of outstanding aircraft could be filled. There are answers to these questions and ample precedents for our suggestions. Certainly it would not be practicable to preserve more than a few actual aircraft, but the skill of model makers is such that scaled-down versions could be built which would be at once true representations, instructive in every detail, and delightful workmanship in themselves. Models already to be found in the Science Museum, the R.U.S.I., and the reception halls of several aircraft manufacturers come at once to mind.

The task of selecting the aeroplanes to be preserved "in the flesh" would be an unenviable one; but, on the other hand, every design with a claim to fame could reasonably be represented by a scale model—each, we would suggest, being to the same scale.

In one or two instances the building of exact, full-scale replicas would be justified, and what an excellent exercise for a technical school or similar body—like going to sea in sail! The first aeroplane of all, after a long sojourn in the Science Museum, was returned to its country of origin, and a replica, perfect in every detail, built by the de Havilland Technical School, replaces it in London. Thus the Wrights' machine is in effect still with us.

FROM ALL QUARTERS

Comet's Khartoum Flight

LAST Wednesday, January 20th, a Comet 2, G-AMXA, was due to attempt to establish a new time and speed record (non-stop) between London (Hatfield) and Khartoum. The aircraft is the first production Series 2 Comet for B.O.A.C., and it will be remaining at Khartoum for approximately two weeks to complete its tropical trials. It is the 23rd production Comet of all types. The pilot will be John Cunningham; with him will be Peter Bois, Capt. A. M. A. Majendie, Capt. H. J. Field (head of B.O.A.C. operations development unit) and technicians including A.R.B. representatives.

The existing record is held by an R.A.F. Lincoln with the time of 14 hr 25 min 47 sec, and a speed of 213 m.p.h. The Comet's arrival over a finishing line across the centre of the airfield at Khartoum is timed for 1615 hr local.

The Bristol Orpheus

ANTICIPATING "a considerable demand" for light, medium-thrust turbojets for operational aircraft, such as light fighters and jet trainers, the Bristol Aeroplane Co., Ltd., has designed and is now developing an axial-flow unit known as the Orpheus. The first announced installation will be in the Folland Gnat light fighter, some thoughts upon which were expressed in our issue of April 3rd last year.

It will be noted that the term "medium-thrust" might apply to any unit of between 4,000 and 6,000 lb thrust, and that a number of present-day jet trainers, notably the Fokker S.14 (flying impressions of which appeared last week) and the American T-33, are already flying with 5,000 lb thrust.

The Mitchell Memorial Lecture

YESTERDAY, January 21st, the first Mitchell Memorial Lecture was due to be given at Southampton, as a "main" R.Ae.S. event. The speaker was Mr. J. Smith, C.B.E., F.R.Ae.S., A.M.I.Mech.E., chief designer to Vickers-Armstrongs' Supermarine Works; his subject was the life and work of R. J. Mitchell and the lessons to be learned. A report will appear in our pages next week.

Denmark Honours Neville Duke

FORTY years ago the Royal Danish Aero Club (which was founded in 1909) instituted a golden plaque for meritorious services in the promotion of aviation. Since its inception, however, only ten awards have been made, the recipients including Holger Hojriis, a U.S. citizen of Danish descent, who flew from America to Copenhagen in 1931; the Dane Ellehammer, whose pioneer aircraft was illustrated in our "Fifty Years of Powered Flight" issue (December 11th); Roald Amundsen, the Norwegian polar explorer; and Bernt Balchen, another great polar airman, now a general in the U.S.A.F.

For the first time, the award has now gone to a Briton, in the person of S/L. Neville Duke, chief test pilot to Hawker Aircraft, Ltd. As briefly mentioned in our previous issue, the presentation was made at Londonderry House on Thursday of last week by Mr. Vagn Christensen, general manager of Scandinavian Airlines, who remarked that S/L. Duke was the first pilot to fly at supersonic speed in Danish air, the occasion being his visit last October in a Hunter 1. Replying, S/L. Duke recalled that the trip was not his first visit to Denmark, for at the age of 15 he had done the rounds of the historic monuments. On the recent occasion he had seen even more interesting things, notably a lager brewery where millions of bottles are filled each day — reminding him of the production rate at a certain aircraft factory with which he is associated. (One gathers, incidentally, that on his flight to Copenhagen S/L. Duke aimed a supersonic bang, which came to earth in Sweden, anticipating that made by the Saab Lansen two or three days later.)

As a result of the Hunter demonstrations it is hoped a sizeable order will be placed by the Danish Ministry of Defence. The Rolls-Royce Avon is the likely power plant.

S/L. NEVILLE DUKE receives the Royal Danish Aero Club plaque from Mr. Christensen.

Proving the Beverley

RECENT intensive flight trials of the prototype Blackburn Beverley military transport (four Bristol Centaurus) included the first tests at maximum weight. At the controls was the company's chief test pilot, Tim Wood, and on the first take-off at gross weight he had the Beverley off in a distance only slightly longer than the estimated figure, reducing the run on subsequent flights. Later on the same day No. 4 engine—the most critical—was cut at take-off, and the Beverley climbed away on three to a height of 5,000 ft., where No. 3 was cut. Flight on the remaining two Centaurus is described as "satisfactory", and even at maximum weight height was maintained.

As the Beverley is a military prototype no specific figures can be quoted, but it is disclosed that a height above the estimated ceiling has been achieved. In a light wind, and using the Dunlop Maxaret wheel brakes, the Beverley used less than half the 1,400-yd runway at Brough for landing and could, of course, have further reduced its run by use of the braking airscrews. Despite wet grass and mud near the dispersal area no trouble was experienced during ground manœuvres.

To achieve the gross weight water ballast tanks holding 1,500 gallons (1 gal. = 10 lb.) were installed in the main freight compartment, and were also utilized to alter the c.g. position.

The S.A.S. Arctic Route

THERE have been further developments in Scandinavian Airlines Systems' preparations for their trans-arctic service to America. Their fourteenth DC-6B is due to be delivered from Los Angeles today, January 22nd. It is commanded by Captain Poul Jensen, who was captain of the company's first flight over the arctic in 1952. Today's flight is deviating from the planned route in order to familiarize the crew with the entire area and alternative landing places. Leaving Los Angeles at 0800, OY-KMU *Gorm Viking* is putting down at Calgary, Edmonton, Fort Churchill and Frobisher Bay, and a final refuelling stop is being made at Sonderstrom Fjord (Bluie West 8).

Negotiations between the American, Scandinavian and Canadian Governments are now in progress over permits for S.A.S. to establish a scheduled round-trip service from Los Angeles or San Francisco *via* Edmonton and Bluie West 8. Per A. Norlin, president of the company, said recently that since the discussions had only recently been resumed it was impossible to state when commercial flights could be inaugurated; but should the outcome of the negotiations be satisfactory S.A.S. are in a position to start scheduled flights on May 1st.

In Memory of C.G.G.

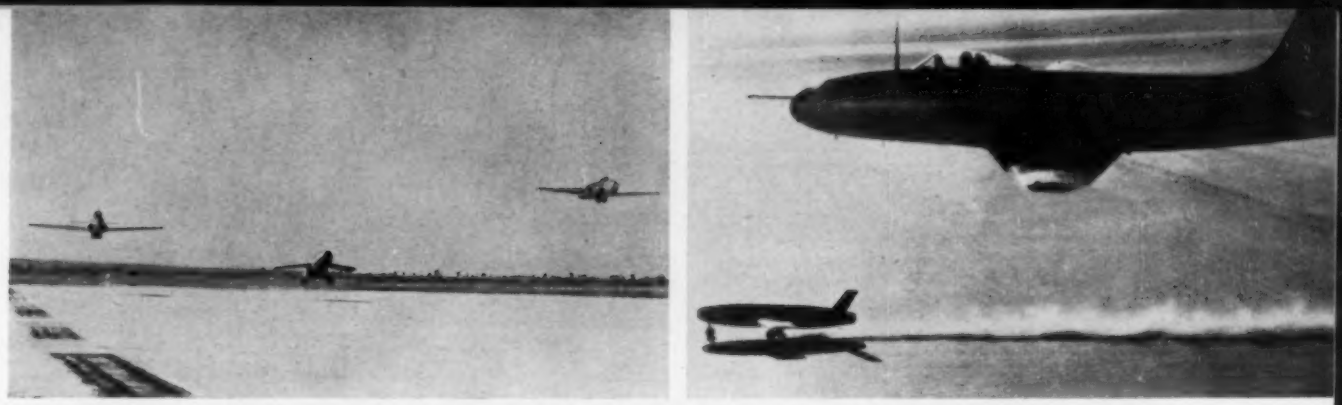
ON Wednesday of last week a memorial service to Mr. C. G. Grey—who died on December 9th at the age of 78—was held at Christ Church, Down Street, London, W.1.

The Rev. Howard Marshall officiated, and the large congregation included senior officers of the Services and many members of the aircraft industry. Mr. Roland E. Dangerfield (chairman and managing director, Temple Press, Ltd.) read the lesson, and a sincere and moving tribute to Mr. Grey's work and personality was paid in an address by Marshal of the Royal Air Force Lord Tedder.

Sabre Simulation

OF three mobile Sabre simulators being built by Redifon, Ltd., for the R.C.A.F., the first, with General Electric J47 engine characteristics, is to be handed over to A.V-M. Campbell at a London reception on Thursday, January 28th. The second and third simulators will be Orenda-powered, and the three represent a $3½ million order gained in the face of strong American competition. When the contract was signed in July 1952, first delivery had to be guaranteed in eighteen months. The Sabre simulators are mounted on semi-trailer vehicles designed and built by Park Royal Vehicles, associates of Redifon, to Canadian specification. The intention is that they shall move round with the wings or squadrons, and it has been suggested that one or more might be made available on occasions to the R.A.F. The power plant for the simulator is carried on a separate two-axle trailer vehicle built in this country to R.C.A.F. standards.

A Britannia simulator for B.O.A.C. will also be delivered towards the end of this year, the originally planned delivery date of March having been postponed because certain details of the aircraft essential for the design of the simulator had not been settled between B.O.A.C. and the Bristol company. The company are also building a number of Valiant and Victor simulators for the R.A.F., and of the Gannet to a Navy order. Several other



REGULATING REGULUS: Now in an advanced stage of development is the U.S. Navy's Chance Vought Regulus (Fairchild J44 turbojet)—claimed to be the only "operational guided missile which carries its own landing gear and can be recovered intact after a flight." In the aerial picture the missile is taking off at Edwards Air Force Base, California, with a single-seater TV-1 (Lockheed Shooting Star variant) in control. The other picture shows the Regulus being brought in for a landing with two TV-1s in attendance.

FROM ALL QUARTERS . . .

simulators at present on an I.T.P. basis are likely to become the subject of contracts.

Last Monday evening several departments of the Redifon factory at Broomhill Road, Wandsworth, were open for inspection by employees of C.R.S., Ltd., an associated company, the Redifon Engineers Club acting as hosts. On this occasion *Flight* was able to examine a model of the Sabre simulator, of examples of instrument panels for the Britannia, of computing potentiometers and a most realistic synthetic jet-engine noise generator.

Vickers in Canada

TO assist T.C.A. in the introduction of their fleet of 15 Viscounts, the first of which is due for delivery in August, the Weybridge aircraft division of Vickers-Armstrongs, Ltd., is to open an office in Montreal. It will be managed by a senior member of the manufacturer's technical staff, Mr. M. J. Wadsworth, who will be accompanied by two service engineers. Vickers have also announced that spares valued at $100,000 are being stocked at T.C.A.'s Winnipeg base, this will provide the airline with over-the-counter spares service, particularly of heavy items which would otherwise take some time to ship from Britain.

FOUR-ENGINED FIGHTER: This French Meteor NF11 has been equipped as a high-altitude test-bed for two SFECMAS (formerly Arsenal) ramjets. This engine, which was shown at last year's Paris Salon and has already flown on a Ju188, has a diameter of 24in and a sea-level thrust of 1,100 lb at 621 m.p.h.

PLAIN MAN'S GUIDE TO GUIDANCE

THE nature of that curious and fearsome beast the guided missile is yet but imperfectly understood even by many *soi-disant* authorities engaged in its development and production, while the ignorance of the laity remains profound. Any simple exposition of its characteristics and possibilities is therefore heartily to be welcomed, and such a contribution has just been made by the S.B.A.C.

It is pointed out by that body that the problem facing the missile technician is very different from that of the anti-aircraft gunner, who relies on the accuracy of his gun and radar prediction equipment to enable him to hit the target. The missile expert, on the other hand, has to manœuvre the missile after it has been launched and the object of the designer is a missile which can be aimed in the general direction of the target and will subsequently seek it out and hit it.

Though missiles can be of several basic types, i.e. air-to-air, air-to-ground, ground-to-air or ground-to-ground, the guidance systems used for them all have much in common. A missile can be homed on to its target either by what is termed "passive" homing (whereby the missile homes on to a source of energy radiated by the target) or by "active" homing (whereby the missile itself transmits energy which is reflected back from the target, thus establishing its position in space). The energy radiated or reflected by the target can be any of the various forms of energy produced by an aeroplane in flight—i.e., heat, noise, wake, infra-red radiation or static electricity—some of which can be detected at a distance of many miles, others only at short range.

By fitting the missile with a detector or receiver which will pick up responses from the target, amplify them and pass the information as to their direction and strength to the controls of the missile, the missile can be automatically guided to the source of energy. This "passive" homing is usually a relatively short-range technique.

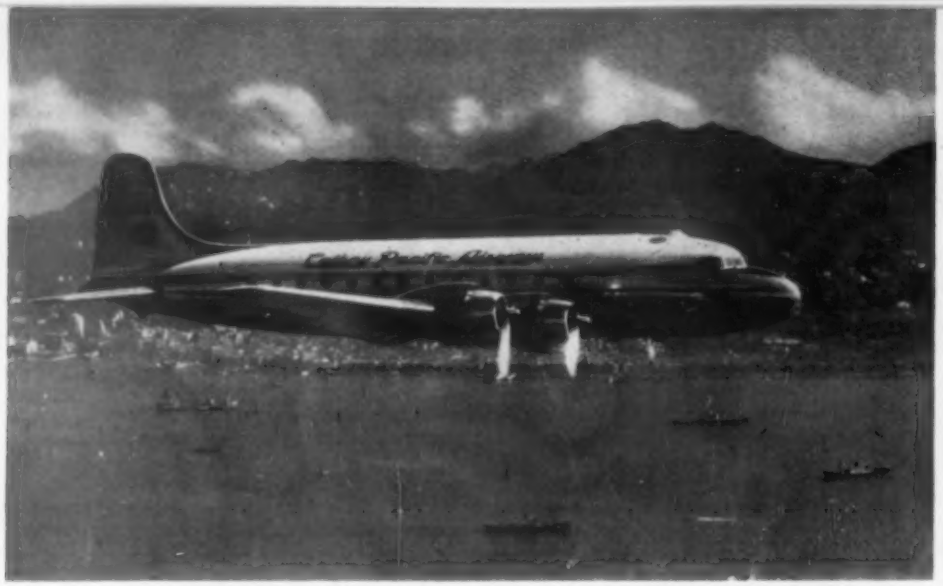
To pick up targets at longer range "active" homing is used—that is, the missile itself transmits energy and picks up the reflection or echo from the target, which is, in turn, used to steer the missile on to it. It is therefore necessary to carry in the missile a transmitter as well as a detector or receiver, and a radar set is an obvious medium. The drawback is the weight of the equipment necessary, and the resulting size of the missile if an aerial and a heavy power supply have to be carried. Thus, though the system can be a long-range one in practice, the resulting bulk limits the distance over which it can be employed. These limitations on transmitter size can be overcome if, instead of carrying the transmitter in the missile itself, it is placed elsewhere—perhaps in a larger aircraft, on land or on a ship. In this way the complete guidance system is a remote high-power transmitter with a small receiver in the aircraft capable of directing the missile to the source of reflected energy. This is known as the "semi-active" homing system and is at present accurate over ranges of the order of 17 miles.

Another system of guidance, which gives about the same results, is "beam-riding." In this case a radar beaming device in another aircraft, in a ship or on the ground locates the target and "locks on." The missile is fitted with a rearward-looking receiver which, together with the control system, ensures that it flies dead along the centre of the beam.

The disadvantage of these two "long-range" systems—the semi-active homing and beam-riding—is that the farther the missile flies from the transmitter the less accurate is the information which it receives, although the nearer it approaches to the target the more it is in need of accurate steering. This disadvantage is overcome by carrying yet another transmitter in the missile itself, which is not switched on until the final phase.

The operational sequence of the missile can be stated as follows: it is launched, reaches supersonic speed, the booster rockets fall away, and the missile settles down to controlled flight. At this stage—the mid-course—the semi-active or beam-riding homing devices take over. These transmitters locate the target and pass the information to the receiver in the missile, which in turn operates the controls and maintains the course over the greater part of the journey. Finally—shortly before reaching the target and when the "outside" transmitter may be insufficiently accurate—a small transmitter in the missile itself takes over and actively homes on to the target.

The S.B.A.C. summary concludes: "If a number of missiles are being launched from widely separated points, they must all be headed in the approximate direction of the target. For this reason it is necessary to have a 'gathering' phase before the active homing begins. A long-range interception by guided missiles would, therefore, consist of a 'gathering' phase when the weapons are headed in the correct direction, followed by mid-course navigation and, last, a 'final, terminal or homing' phase."



Cathay's DC-4, which flies for 80 hours each week, and has logged nearly 22,000 hours in its lifetime, seen over Hong Kong Harbour near its base at Kai Tak. It provides first-class accommodation for 46 passengers on services to Singapore and Calcutta. In the picture opposite, Governor Adlai Stevenson of the U.S.A. is seen disembarking from the DC-4 at Saigon during his "fact-finding" tour.

CATHAY PACIFIC

A British Independent Airline's Enviable Record of Regularity and High Utilization

AT Labuan, in British North Borneo, a DC-3 of Cathay Pacific Airways was delayed some months ago for the lack of certain engine spares. The captain sent an urgent AOG ("aircraft on ground") signal to the company's base at Hong Kong. At about midnight that evening a Chinese radio officer employed by Cathay Pacific returned to his home from a visit to the cinema and, idly tuning his own "ham" radio station, picked up the Cable and Wireless frequency. He found himself listening to the text of the AOG telegram, which he scribbled down on an envelope and then telephoned to the chief pilot's home. The chief pilot rose from his bed and drove to Kai Tak Airport, where he sorted out the parts needed and put them on a Qantas service which left at 8 a.m. for Labuan. At nine o'clock the original telegram was delivered at the Cathay office.

This incident illustrates the enthusiasm and team spirit of this British airline, attributes which play a large part in the driving force that is enabling it to respond very successfully to the challenge of competition from the major trunk operators in the Far East.

Cathay Pacific was formed in February 1946 by an American, Roy Farrell, and an Australian, Sydney de Kantzow, with some other partners. Both had been pilots with the China National Aviation Corporation, flying over "the hump" from Calcutta to Chungking in DC-3s. Their venture sprang from a plan to use their own aircraft to import manufactured goods from Australia and sell them at a well-earned profit in a Far East still suffering from acute shortages after the Japanese occupation.

The fleet soon built up into seven busy DC-3s. As yet there were no problems over traffic rights, for all the Far East governments were only too glad to see trade and people on the move again. By 1948, however, post-war aviation legislation was beginning to make itself felt, and a requirement for the local ownership of capital led to a reorganization. A new Cathay was registered in Hong Kong, with interest vested in Australian National Airways, in the old Eastern shipping firm of Butterfield and Swire, and in some of the original partners led by de Kantzow himself, who remained general manager. In 1951 there was a further reorganization when de Kantzow retired, his shares and those of the other remaining original partners being taken up by Butterfield and Swire and their associated shipping interests.

Present-day operations are in many respects a model of high utilization combined with administrative economy. The fleet consists only of one DC-4 and two DC-3s, yet a formidable volume of work is achieved. The DC-4, registered VR-HEU, began life with K.L.M., in whose hands it put in 6,000 hours before Cathay bought it; before that it had flown some 3,000 hours in military employment. It is fitted for 46 passengers and is operated with catering and passenger-service facilities to first-class-travel standards.

Each week this one aeroplane makes two return trips Hong Kong - Bangkok - Singapore (40 hours); then one 17-hour return trip Hong Kong - Saigon - Singapore; and a return trip Hong Kong - Bangkok - Rangoon - Calcutta (23 hours). Thus 80 hours per week are clocked up the year round, with two months out of service for a complete C. of A. overhaul every 8,000 hours, as demanded by the approved inspection schedules. The overhaul becomes due approximately every two years, and a substitute aircraft is then chartered. HEU has logged nearly 22,000 hours to date. A feature of the operational plan has been a weekly connection with the Comet service at Bangkok; the schedule allows 1½ hours' margin, and Cathay have never yet been late. The two DC-3s, VR-HDA and HDB, make two return trips each week Hong Kong - Manila - Sandakan - Jesselton - Labuan and one return trip Hong Kong - Haiphong - Hanoi.

The very high utilization of the DC-4 is made practicable by one main principle. In the event of serious delay, the trip is abandoned and the passengers are transferred to other lines; if the cause is an engine failure, the aircraft may make a three-engine ferry flight to Hong Kong for the trouble to be attended to. In any case action is taken with the one object of getting back to punctual schedule as soon as possible. This may sound somewhat drastic, but indicative of what occurs in practice, up to mid-December of last year there had been only one such abandoned trip.

Kai Tak Airport is notorious for its difficult picturesque approaches through the mountainous islands which surround the Colony, and also for its bad weather during five months of the year. The experience and local knowledge of Cathay pilots frequently gives them an added factor of safety which enables them to land in weather conditions which cause other operators to divert. Out of a total of 211 civil diversions for weather in the last four years, Cathay's DC-4 has suffered only six. As a result, the company now have a high reputation for regularity and reliability in the Far East.

Maintenance standards also influence regularity. Cathay's engineering repute rests in the hands of the Hong Kong Aircraft Engineering Company, who look after the aircraft under contract and under the eye of J. T. Gething, the airline's chief engineer. H.A.E.C. do the transit maintenance for most of the international operators using Hong Kong, including B.O.A.C., Canadian Pacific, K.L.M. and half a dozen others.

Cathay's centralization of engineering is a factor in the reduction of overheads which is the keystone of management policy. A small fleet operating at high utilization; contracted engineering with the minimum of directly-employed ground staff; the use of agents at all out-stations; the principle of bringing the aircraft back to base daily so that all maintenance checks are done at the centre; together, these enable Cathay to quote passenger and freight rates which average twenty per cent below I.A.T.A. rates, without detriment to safety or comfort.

The lower fare-structure is largely accepted by I.A.T.A. operators in the region, with most of whom inter-line agreements exist. The traffic on the main routes has increased steadily over the past three years. Cathay's management attributes this to the continuously growing public respect for the company's operations. There is a firm traffic-foundation of Chinese, Indian and European businessmen, the last predominating; many more Chinese would travel were it not for the severe immigration restrictions on Chinese in most South-East Asian countries. Even so, Cathay

carry more passengers into and out of Hong Kong than any other airline based in the East.

A worthwhile tourist trade has developed from Manila to Hong Kong which, with its climate, scenery, shopping and entertainment is the Mecca of American Servicemen in the East. There is a surprisingly large traffic in athletic teams moving around the East, and—perhaps more valuable than any other source of traffic—there are the regional feeder connections at Bangkok and Singapore, where businessmen returning from Europe say that boarding the Cathay aircraft is "like getting on the home bus." Cathay are also being used increasingly as a feeder mail service to Europe, and mails carried by the company to connect with the Comet service have been reaching England in record time.

Political difficulties add to the responsibilities of the operations manager, Captain C. F. Moore. Because China is closed to aviation, the alternative airport for Hong Kong must be Manila, 700 miles away. Tainan, on Formosa, is an emergency substitute only; it is a military airfield with few facilities for commercial passengers. The large fuel reserves necessary are an economic handicap, to say nothing of the consequences of the mis-positioning which must result from a diversion. Similarly, the DC-3 flights from Hanoi, in the Red River delta, to Hong Kong would normally take 3½ hours; but because of the need to take a big dog-leg round the Communist-held island of Hainan, the present flight-time is five hours.

Meanwhile, Hong Kong aviation must look forward to improved political conditions, so that operations into and through China can be resumed, perhaps even restoring Kai Tak to the position it held briefly a few years ago—that of being the world's third busiest airport.

The question of re-equipment must necessarily be continuously in the minds of those responsible for such intensive operation with relatively old aircraft; but it is not easy to find in any country a modern aeroplane which is not in the half-million pound class yet which bears the burden of the Manila diversionary fuel so lightly as does the DC-4. There can be few other regional networks in the world with a minimum stage-distance of 700 miles, to which must be added in some cases a four-hour diversion reserve.

World politics permitting, the future of Cathay Pacific should be bright. There must be some more evolutionary changes in local air transport organizations beyond the agreement reached in 1949, when Cathay Pacific Airways and Hong Kong airways were given operating regions South and North of the latitude of Hong Kong respectively. Hong Kong Airways started off as a wholly-owned B.O.A.C. subsidiary, and were later sold to the great China firm of Jardine, Matheson. After China was closed to the West, Hong Kong Airways sold all their aircraft; present operations are conducted by North West Airlines, utilizing Hong Kong Airways' traffic rights as far as Taipei.

There have been many rumours of a merger between Hong Kong Airways and Cathay Pacific Airways. This would be both logical and in the interests of the operators, the public, and the Colony's prosperity. It has even been hinted that such a merger might embrace a B.O.A.C. interest and extend as far afield as another prosperous and efficient British operator, Malayan Airways. Meanwhile, Hong Kong can record with satisfaction a solid achievement by one of the few private scheduled operators under the British flag.

ARMY CO-OP BY PRIVATE OWNER

SO keen was a company of the Devon Regiment in Kenya to have air support close at hand that arrangements were made to cut a special landing strip out of the crest of a hill 7,100ft up in the Aberdare mountains. The unit concerned had previously been stationed at Squaire's Farm, with an airstrip adjoining the camp, and the close liaison with the R.A.F. which had thereby been made possible caused the Devons to want a strip for their new camp at Kihuri. The site was on a hill-top in the mountains, apparently completely inhospitable to aircraft.

Mr. Dodds, owner of a Piper Pacer and member of the Kenya Police Reserve, inspected the lie of the land and decided that an airstrip could nevertheless be built. With the aid of 500 natives from a neighbouring area the strip was cut out of the edge of the ridge, an earth scraper being improvised with a baulk of timber. Construction took ten days. After allowing a fortnight for the ground to settle and harden, Mr. Dodds made the first landing in his Pacer, and found the strip adequate and safe. He has since used it regularly.

As the photographs show, the strip is perched like a carrier's deck among the hills and measures 550 yd × 25 yd. The normal approach for landing is made level towards the brow of the hill in true carrier style.

The frequent torrential rainstorms in this region do not affect operations, because the ground drains itself satisfactorily; Mr. Dodds has flown from Kihuri in heavy rain without trouble. He maintains regular communication by air between the Kihuri strip and Mweiga, the Harvard base, as well as spotting for the Kihuri company, and dropping supplies to their patrols when necessary.

Like a carrier's deck, but without benefit of ship-made wind: the strip cut on the hillside, with the Aberdare range and forest in the background. Above, the Piper Pacer is run-up preparatory to take-off.

HERE AND THERE

AVALANCHE RESCUE: A Swiss Hiller takes off from the stricken Austrian village of Blons with a victim strapped on an exterior stretcher (see "Snow Rescues by Helicopter," below).

The Vickers 1000

IT is now learned that the target date for the first flight of the Vickers 1000 (four Rolls-Royce Conway by-pass engines) is the summer of next year. Good progress is being made with the construction of the prototype at Weybridge. The civil version, the V.C.7, will be capable of carrying 100 passengers on direct Atlantic services (or up to 150 on shorter routes) at over 600 m.p.h.

Forgiven ?

ORIGINALLY suspended until May 1954, the licence of Major Christopher Draper (who flew an Auster Autocrat under 15 Thames bridges last May) has now been restored to him by the M.C.A.

Record ?

AN Indian gliding enthusiast, Rashid Irani, has qualified for his "A" and "B" certificates. He is nine years old.

Russian Participation

THE Soviet Aero Club, reports Moscow Radio, has established an "Interplanetary and Astronautical Section"; also reported in the sending of two Club representatives, E. N. Stepanov and B. E. Turchin, to Paris for the conference of the Parachuting Commission of the F.A.I. One of them suggested that parachuting contests should be included in the Olympic Games.

Britannia over London

IN the clear blue sky over London last weekend the shape of the Bristol Britannia made a pleasant change from the many more familiar ones to be seen approaching or leaving London Airport. The sun frequently caught its large, brightly polished tail, which provides a good recognition feature. In plan view the shape and length of the engine nacelles and their disposition along the wing distinguishes the type from all others. The note produced by the four Proteus is also unique. The machine concerned was the second prototype, which was taking advantage of the excellent aids provided in the London area to check its radio equipment and I.L.S. Mr. Bill Pegg was at the controls. This Britannia is due to visit London Airport today.

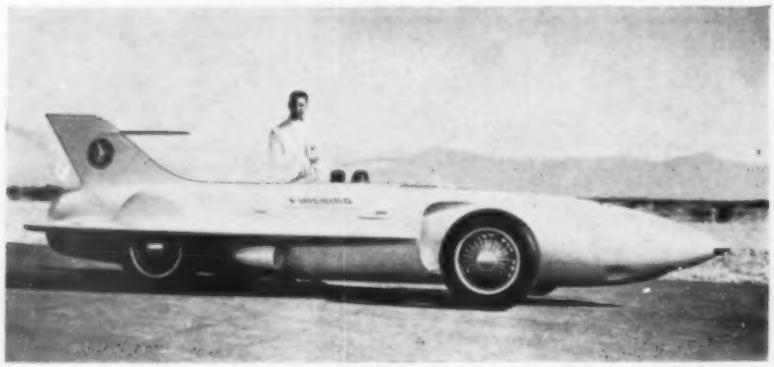
Radar Enigmas

"SOME Unsolved Radar Problems" is the subject of a lecture to be given to the Radar Association on Wednesday, February 10th, by Mr. K. E. Harris, Cossor's director of development. The meeting, which is open to non-members, will be at 7.30 p.m. in the anatomy theatre, University College, Gower St., London, W.C.1.

The Nash Collection

LAST week we were able to record the good news that the Nash Collection of historic aircraft has been purchased by, and will be preserved by, the Royal Aeronautical Society. An inspection of all the aircraft and material concerned was due to be made last Wednesday. It is probable that in the Nash hangar at Brooklands, Weybridge, are several treasures in the way of power units and components which had been forgotten by all but the few who have preserved them to date. The purchase is understood to include not only complete aircraft but dismantled components and other parts of historical interest.

EARTHBOUND SABRE: General Motors' Firebird experimental, glass-fibre-bodied, turbine-powered car. The free-turbine engine, designated as the GT-302 Whirlfire, weighs 775 lb. Transmission is through a clutchless torque-converter; maximum engine revolutions are 26,000, producing 13,300 shaft r.p.m. and 370 h.p. Unlike the Rover gas-turbine car, which first appeared in 1950, the Firebird has no fuel-conserving heat-exchanger.



Snow Rescues by Helicopter

SWISS and American helicopters played a prominent part in the rescue operations in Austria after the village of Blons was engulfed by avalanches. Swiss Army Hillers carried out the first air reconnaissances and made contact with survivors; they then carried many of the injured to safety at Ludesch, where rescue headquarters were established. American S-55s of the 48th Air Rescue Squadron brought medical aid and two snow dogs to the area and joined the Swiss Hillers. None of the helicopters could be fully used until conditions had improved sufficiently for engine vibrations not to cause danger of further avalanches.

R.A.N. Helicopter Hold-Up

THE Royal Australian Navy's three Sycamore helicopters have been temporarily grounded, according to a Sydney report. It is stated that they are awaiting the arrival of later-design tail-rotor shafts.

Second YF-102 Flies

THE U.S.A.F. announces that the second Convair YF-102 supersonic delta-wing all-weather fighter, powered with a Pratt and Whitney J57 turbojet, has completed its initial flight. The first example was flown on October 24th last year but was written off in a wheels-up landing following power failure at take-off. The second machine was completed on December 14th and production models are now being assembled at San Diego, California. The F-102 will be fully automatic in operation, the pilot acting as a monitor. Proposed armament is the Hughes Falcon missile.

Late Worm Gets Bird ?

NEWS-STORY date-lined Washington, January 12th: "A team of American jet-planes which leave on Saturday for a 30-day goodwill tour of Latin America will be the first modern jet air force planes seen there, the United States Air Force announced. The planes will include F-86 Sabres, F-84 Thunderjets, F-80 Shooting Stars and T-33 trainers, as well as supporting aircraft of other types." We print this as received, with the thought that it might perhaps have begun, more accurately: "Owing to the profound impression caused in South America by the visits and sale of the British Canberras and the call of the Avon-Comet, the U.S.A.F. feels a need to offset . . ."

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The refuelling of a Boeing B-47B medium bomber by a B-47 tanker (seen in the picture above) is indicative of the faith which the United States Air Force has placed in the advantages to be gained from a flight-refuelled Air Force. It exemplifies, too, the adaptability of the British Probe-and-Drogue system to high speed, high altitude, jet aircraft, for which it has special advantages of flexibility, compactness and light weight.

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PRESERVING HISTORIC AIRCRAFT

Another Call for Action—With Some Detailed Suggestions

By GRAEME WEIR

IN our issue of November 6th the much-debated topic of housing all Britain's historic aircraft in a central national collection was revived in an article by A. Cdre. A. H. Wheeler, and on November 27th another expert in the subject, R. G. J. Nash, contributed his views. In the present article, a reader who has evidently given the matter a great deal of thought makes suggestions more concrete than any hitherto put forward, though he confines his views mainly to the preservation of military types. Some of his ideas—particularly those concerned with the servicing of the exhibits—would demand much of the enthusiasts; but we gladly accord them space. That at least one responsible body in this country is alive to the importance of the situation is shown by the excellent news—recorded in our columns last week—that the Royal Aeronautical Society has acquired the Nash Collection, for which an offer was recently received from America (further developments are mentioned in this issue). Mr. Weir's article was written before this news reached him, but his arguments remain unaffected.

WHAT shall be done to preserve our historic aircraft? A great many people have written a great many words on this subject over the past few years; but, one and all, they have then sat back and waited for the Air Ministry, or some such body, to step in. This is obviously not going to happen. Very well then; if those who should do the job cannot (or will not) take action, why not do it for them? In other words, let the public look after the aircraft.

With this in mind I have made certain enquiries, the results of which encourage me to believe that, given enough public support, there is a very good chance of forming an association to shoulder the responsibility.

Organizing such an association would not, of course, be easy. Let us examine the main problems with which it would have to contend.

Obtaining the Aircraft.—Many of these would have to come from the Royal Air Force, which means approaching the Air Ministry. I am fairly certain that the Ministry would gladly give the aircraft into the hands of a responsible association. Manufacturers would also have to be apprised of the scheme and their approval obtained. There, again, one would not anticipate too much trouble.

It must be realized, of course, that no action in this direction can be taken until it is quite certain that the association is a practical proposition.

Where to Keep Them? On this there are two schools of thought: The aircraft could be in a museum proper, or they could be kept on an airfield from which airworthy examples could be sent to flying displays all over the country.

Those who favour the former suggestion argue that aircraft kept permanently indoors would be preserved indefinitely, and all who wished to see them would know where to find them. Others, however, believe that the cost of such an establishment could only be met from Government funds. A building housing several dozen aircraft, including twin and multi-engined types, would need to be very big indeed. Moreover, as the years passed, further aircraft would become eligible for admission and even the largest of buildings would soon be filled. If the necessary money was forthcoming, no doubt more buildings could be obtained, but it is doubtful whether they would be adjacent to the main museum or even in the same city; the advantages of centralization would thus be lost.

Another argument against the "static" museum hinges on the fact that so many characteristics of particular aircraft are completely lost unless the machine can be seen—and heard—in flight: contrast, for example, the Spitfire which stands in lonely, flat-tyred silence in the Imperial War Museum with the remembered appearance in flight of the world's most beautiful and most deadly fighter, and the sound of its Merlin. The anti-museum faction believe that an aeroplane belongs in the air, and that as long as it is flyable it should be flown—provided, of course, that every precaution is taken to ensure its safety.

The alternative, then, to the museum is something on the lines of the Shuttleworth Collection, the aircraft being looked after with loving care and those that can be flown appearing in the air before the public.

Let us examine this idea. The three main problems are (1) obtaining an airfield and hangarage; (2) servicing the aircraft; (3) paying for (1) and (2). The airfield used would have to be easily accessible by road and rail. It would have to be suitable for the larger types, such as the Lancaster, to fly into and out of. Fairly extensive hangarage would be needed, and a certain amount of repair and maintenance facilities available.

Possibly the Air Ministry would allow a suitable ex-war airfield to be rented at a reasonable rent; it is unlikely that they would let the association share space on an active R.A.F. Station. Alternatively, one of the flying clubs using large airfields might be in a position to let or sub-let space to the association. The club would undoubtedly benefit from the attendant publicity—and think of the roaring trade the club restaurant would do!

As a last resort the association would have to find a suitable field, obtain approval from the M.C.A. and other official bodies, and install hangarage, etc. But this would be easier said than done.

Maintenance is the next major problem. I do not know the operating costs of, say, a Wellington, but even allowing for the removal of all non-flying equipment they would still be formidable. Whether flying or merely static exhibits, all the aircraft would need constant care and attention.

Some of the minor servicing could perhaps be done by ex-R.A.F. members of the association having the necessary experience and willing to work at such jobs in their spare time. Then there are the manufacturers. Having given their consent to the aircraft being handed into care of the association, they might well be prepared to assist with the maintenance of them. Most manufacturers, I feel, would look upon the association as a cause worthy of assistance; and in any case, the aircraft—especially those still flying—would be a form of publicity for them. Then, again, we have the professional aircraft engineering concerns. These might consider it a good deed (and/or good publicity) to service the aircraft at a reduced rate.

Directly connected with the problem of maintenance is that of tools and spares. Here again one hopes for a benevolent Air Ministry; but the whole maintenance question is a subject for enquiries—enquiries which can only be made when there is enough evidence to convince people that the questions are not being asked from idle curiosity.

Finance. Unless enough members were forthcoming to start the association off with sufficient capital, it would not survive for very long. And without sufficient members and capital to convince the Air Ministry (or other sponsors) that it *could* survive, the association would not even get started.

No organization of this nature could live entirely on the generosity of others. It must have money coming from within itself—in other words, an annual subscription. Individually, members would obtain little material benefit from the association, and people are not going to pay a thumping great subscription each year out of purely altruistic motives. Perhaps something between five and ten shillings per year would meet the case if a large membership could be assured; but this is a subject to which I shall return later.

How about the aircraft helping to pay for themselves? Every summer sees an increase in the number of flying displays; at the present rate, in a very few years' there will be displays every weekend from May to September. Even now, most organizers like to include the older types of aircraft if they can. As the years pass the demand for these aircraft will increase, and that is where the association would come in. The presence of aircraft such as the Hurricane, Wellington and Lancaster would be a great draw to any display. They could be shown, either flying or in a static rôle, for a share of the "gate" or at a predetermined fee to cover expenses and also allow a profit for the association funds. Perhaps, at some future date, the S.B.A.C. might wish to show these old aircraft on the "public days" at Farnborough, to accentuate the great strides made in aircraft design and performance since the inception of the jet engine.

Another way in which the veteran aircraft might occasionally earn money is by acting as temporary "film stars." War films still appear to be good box-office, and those dealing with the war in the air are as popular as any. Already producers are experiencing difficulty in obtaining war-time aircraft for their films; in a few years these difficulties will become impossibilities unless some of these war-time types are preserved. If the only ones left are in the keeping of the association, the inference is obvious.

Many people would come to inspect the aircraft at weekends, and even during the week. When the veterans were at home a small charge of, say, a shilling per head to non-members of the association would not be excessive. A booklet could perhaps be printed dealing with the association and the aircraft in its care; illustrated by photographs and containing information on

PRESERVING HISTORIC AIRCRAFT . . .

both the association and the types of aircraft concerned, it would bring in small but acceptable revenue.

Yet another method of raising money could be an annual garden party with flying display, and/or an annual dinner and dance in London.

I have already said that members would not receive much direct material benefit for their money; and that is why a low annual subscription would be necessary. The only benefits possible, as I see it, are: (1) The satisfaction of knowing that their money is helping to keep some fine old aircraft in existence; (2) reduced admission charges to flying displays at which association aircraft were appearing; (3) the right to inspect the collection free of charge and without unreasonable hindrance (4) admission to the garden party or other events organized by the association.

Summing-up. In making the foregoing suggestions I have had in mind military aircraft of more recent vintage, because other classes are already catered for; the very early types are looked after by the Shuttleworth Trust and the Nash Collection; there is a Vintage Aeroplane Club for, I believe, civilian types of the 1920s and early 1930s, and overlapping the whole lot is the National Aeronautical collection of the South Kensington Science Museum.

To sum up, then, if we are to preserve our historic military aircraft, it seems that the only solution is for the public to form an association and look after the veteran aircraft themselves. Some suggested details have been outlined.

What form should the initial steps take? If these ideas appear workable, as shown by the reactions and constructive criticisms of readers of this article, then further steps must be taken to gauge the probable amount of public support. We shall then know whether or not the Air Ministry can be approached. The importance of adequate support from people interested in the idea cannot be too highly stressed. If an annual subscription of five shillings was decided upon, the association would need 4,000 members to bring in £1,000 per annum—a not very considerable sum for the job involved.

Time is very short. Already the last Wellingtons are awaiting the melting pot, and who knows what other fine old aircraft are in a similar predicament?

COSMIC RAYS AND THEIR DANGERS

—*discussed in Interplanetary Society's Lecture*

THE possible effect of cosmic rays on the human body is important, not only to would-be astronauts, but also to those interested in flight at extreme altitudes. In a paper delivered to the British Interplanetary Society on January 2nd —*The Possibility of Cosmic-Ray Hazards in High-altitude Space Flight*—Dr. L. R. Shepherd, the Society's chairman, reviewed our present knowledge of cosmic rays and the possibility of danger from them.

Some 40 years ago V. F. Hess put forward the hypothesis that the increase in ionization with altitude was the result of radiation from outer space. From this simple beginning, said the lecturer, the study of cosmic rays had expanded until it was now one of the most important branches of physics. By taking up ionization chambers beneath balloons it was found that the intensity reached a maximum at a height of 20 to 30 km and then fell off gradually at greater heights. Subsequently, rocket measurements up to 160 km had shown that the ionization did not show any further increase. The mean intensity of ionization produced at sea-level was about 2 ion pairs/cm³/sec; at high altitude, at a latitude of 60 deg N, the value rose to 360 ion pairs/cm³/sec—an increase of nearly two-hundredfold. The Earth's magnetic field also had an influence on the intensity, since it deflected particles of under a certain minimum energy level. Thus at latitude 3 deg N the peak intensity was only about 100 ion pairs/cm³/sec. However, there was no increase in intensity with increase in latitude past 58 deg, which meant that no particles below an energy of 560×10^6 electron volts were present in space in the vicinity of Earth. One possible explanation of this phenomenon was that the Sun possessed a magnetic field which deflected all particles below this energy.

It had been found that the majority of cosmic-ray particles were positively charged, and for a long time it was assumed that they were all protons—that is, hydrogen nuclei. In 1948 it was shown that some of the particles were in fact nuclei of heavier elements ranging from helium to iron. All of this radiation produced ionization in any material it traversed, and if the material was living tissue it would be damaged.

The standard radiation dosage was the Röntgen or γ-unit and was the amount of irradiation that would produce 2.1×10^9 ion pairs in a cubic centimetre of air at 0 deg C and 760 mm pressure. In this country the upper limit, or tolerance as it was known, was 0.5γ per working week; no worker who was regularly exposed to gamma or X-radiation must repeatedly exceed this dosage. At the maximum measured rate of 360 ion pairs/cm³/sec it would require nearly five weeks to accumulate the allowable weekly dose of 0.5γ and at first sight there would appear to be no danger to the human organism from cosmic radiation. However, this quoted tolerance of 0.5 applied to gamma and X-radiation only and could not, for example, be applied to neutrons or alpha-particles. In fact, for the same total dosage much more damage could be caused by a particle that produced a high ionization density along its path than one that produced a low density.

Dr. Shepherd said that it was more or less certain that the lethal effect of ionizing radiation arose as a result of chemical actions. Excessive radiation could destroy cells almost immediately but the normal effect was to produce changes in the cells which led to their death when they attempted division. Most experimental work had been carried out on plant tissues and it had been found that the lethal effect appeared to be due to structural changes in the chromosomes. This lethal effect depended on the ionization density, i.e., on the number of ion pairs produced per unit length of the track of the ionizing particle. Below 100 ion pairs per micron the relative biological effectiveness was found to be constant, rising rapidly between 100 and 1,000 and remaining constant thereafter.

There were two main hypotheses for the actual mechanism of lethality. One was that the ionizing particle passed through or close to the chromosome, thus effecting direct chemical changes in it. The other was that the ionization produced hydrogen peroxide in the water of the tissue, thereby destroying the enzymes in the cells. Either of these hypotheses could be shown to account for the rapid rise in relative biological effectiveness with ionization densities between 100 and 1,000.

It could be shown that the heavy primaries, and some of the secondary particles produced when the primaries entered the atmosphere, were the most dangerous biologically. The radiation hazard for flight in or just above the atmosphere was not thought to be great even for prolonged exposures. At great distances from the Earth conditions might be worse, and for long exposure-periods some form of shielding might have to be devised. These conclusions were, however, tentative and much more work both in the laboratory and in the upper atmosphere was needed.

PROBLEMS OF PRODUCTIVITY

PRODUCTIVITY was the main theme of a recent lecture before the Brough Branch of the Royal Aeronautical Society. The lecturer was Professor J. V. Connolly, Head of the Department of Aircraft Economics and Production at the College of Aeronautics, Cranfield, and his views caused very considerable interest, subsequently bringing a great many questions.

He said that in recent years sixty teams, each comprising twenty or so experts, had been to the United States to study various industries, and that their findings gave America, on average, a productivity rate of twice the British figure. The American worker, as a result of his high productivity per man-hour, earned on a comparative basis two-and-a-half to three times the wage of his British counterpart.

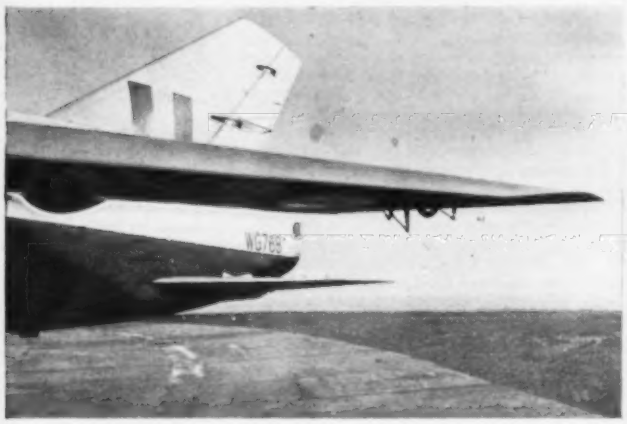
Germany was also stepping up her productivity—as this country would learn to her cost in the next eighteen months or two years; and Japan would provide some fierce competition in certain fields.

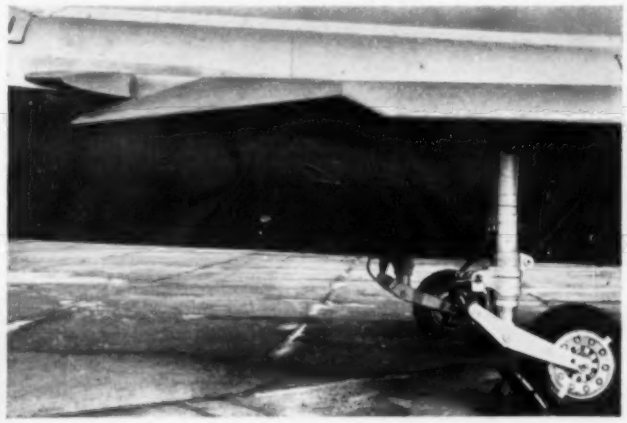
In Britain any wage increase must be allied to greater productivity; the leaders of the engineering unions appreciated the importance of these economic factors. The stop-watch and not the rate-fixer was the standard of work-study in America, and Britain also must employ experts within her industries to raise the productivity rate. To compete in world markets the productivity of all our industries must increase; this was a task and a challenge to both worker and management.

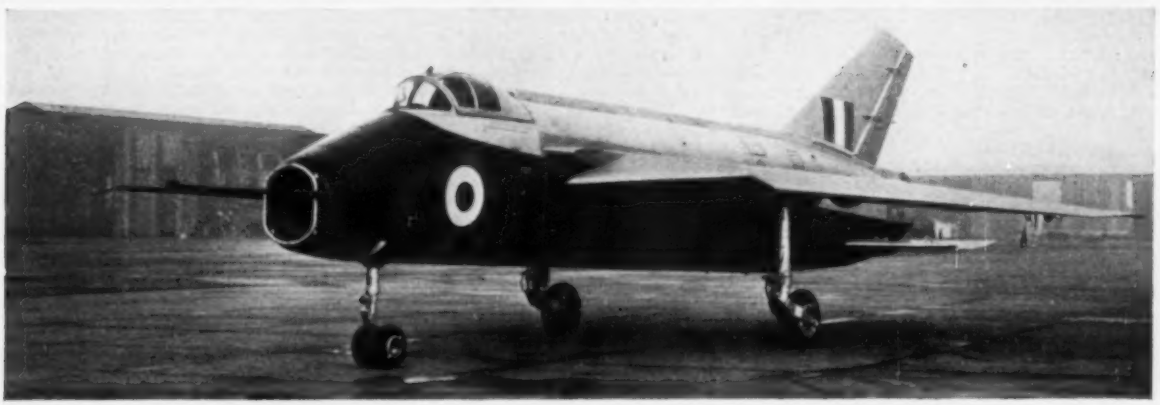
Increase in machine-tool speeds was one of the matters mentioned by the lecturer; he remarked that high-pressure lubricants had, in some instances, enabled cutting speeds to be raised one hundred times. In the field of aviation Professor Connolly referred to the decrease in man-hours with quantity; typical figures were: one off, 16 man-hours per lb; 100 off, 7; 200 off, 4.

RINGING the CHANGES

WITH a twenty-minute flight from Boscombe Down by Tom Brooke-Smith a few days ago, the Short S.B.5 adjustable-wing research aircraft entered on the third phase of its test programme. The first was with 50-deg wing sweepback and high-set tailplane, the second with 60-deg sweep and the same tail configuration, and the present arrangement, as shown in these pictures, is 60-deg sweep and low tail. Before long the sweep will be increased to 69 deg. An innovation, clearly visible here, is the curious triangular portion of "droop-snoot" leading edge in way of the tailplane. This particular arrangement is intended to delay the stall and improve longitudinal stability; wind-tunnel tests show that it should prove more effective, in the case of the low-set tailplane, than the former continuous-droop arrangement.







MANŒUVRABILITY at HIGH SPEED

A Summary of Requirements from the Home of the F-100

THE initial popular assessment of a new fighter is nearly always made according to its published maximum speed. With the present emphasis on supersonic speed in level flight, and the raising of the world speed record, one of the essential characteristics of an aircraft of this type is increasingly tending to be overlooked. This vital aspect is manœvrability. In a paper read to the Society of Automotive Engineers at Los Angeles, Mr. B. G. Petersen, of North American Aviation, set out some of the design considerations for achieving satisfactory manœuvrability in high-speed aircraft.

This manœuvrability, Mr. Peterson began, could not be assessed by one basic parameter, but was nevertheless a quality which had to be incorporated in an aircraft design in the initial phases, whatever the speed range of the aircraft. The advent of high speed, he claimed, brought into sharper focus the adverse effects of high loads, of losses in control effectiveness, of drag, and of stability and control problems. The pilot considered manœuvrability in terms of his ability to control his aircraft and to place it in an advantageous position in relation to another aircraft. It was for the aerodynamicist to translate these requirements into specific design-problems.

The following four requirements emerged: (1) good lift characteristics; (2) suitable control surfaces; (3) high performance; (4) satisfactory handling and flying qualities.

Limitations on Manœuvrability.—The ultimate limit for a given configuration was determined by the following: (a) structural strength; (b) lift capabilities; (c) control surface power; (d) performance.

Dealing with structural limitations, Mr. Peterson said that air loads increased with air speed, and that a given structural design would have a limiting design load which would impose an upper limit on the loading, and therefore on the manœuvrability of an aircraft. Control surfaces would have to be designed to match these limits; they could be raised, but generally only at the expense of increases in aircraft gross weight, thus reducing the ceiling. A comparison of maximum load-factors imposed in combat in World War 2 and the Korean war showed average maximums respectively of 3.5 to 4g and 6g—the increase probably being due to the later use of g-suits which raised the pilot's g-tolerance. Mr. Peterson suggested that considerable advantages might result by designing aircraft for maximum loads of 6g, instead of the present U.S.A.F. requirement of 7.33g. Although aircraft in combat would more frequently be rendered unserviceable by excessive loading, the pilots would still be able to return to base, thanks to the normal strength margins provided.

Another structural aspect arose in the torsional stiffness of the wing, which could limit rolling performance. Wing twist with aileron deflection at high speed would eventually cancel out or even reverse the aileron function. The speed at which this occurred was defined as aileron reversal speed and was normally designed to be above the aircraft's maximum speed. Wing twist, however, still decreased rolling performance at high speed, and the torsional stiffness of a wing therefore had to be considered in the design stage.

Design for Manœuvrability: Lift Characteristics.—The structural load capacity of an aircraft established one limit in manœuvrability; another limitation was set by the maximum lift of the wing. Lift at a given Mach number was proportional to dynamic pressure, and therefore was higher at low altitude; here, the limiting load factor could be exceeded. On the other hand, decreased air density at high altitude also limited available lift. At subsonic speeds, increasing Mach number caused a decrease in maximum lift, whereas at supersonic speeds available lift tended once more to increase.

Radius of turn depended directly on attainable load-factor, and it was therefore necessary to provide the maximum wing lift—consistent, of course, with other requirements. High lift was also required to provide reasonable stalling and landing speeds. The two principal methods of ensuring high lift were the use of low wing-loadings and high-lift devices. Low wing-loadings were necessary for both high-altitude and low-speed performance, but large wing areas were extremely costly in drag at high speeds and in structural weight. Thus increased wing area was neither an efficient nor necessarily desirable method of decreasing wing loading, whereas reductions in aircraft weight were highly beneficial.

There were four principal high-lift devices: flaps, slats, leading-edge flaps and boundary-layer control. Of these, the slats appeared most effective and least complicated at high Mach numbers, although all four devices were satisfactory at low speeds. The basic disadvantage of any device was added weight and complication, and these factors had to be balanced against the advantages obtained; but their effect on stability or control had also to be taken into account.

Buffeting.—Mr. Peterson defined buffeting as a separation phenomenon generally encountered as the wing approached its maximum lift (i.e., maximum unstalled angle of attack). Buffeting became more violent with increases of speed and load factor and at high speeds could be severe enough to cause structural damage; protracted flight in buffeting conditions could lead to fatigue and failure. Buffeting could be alleviated by avoiding bluff bodies, abrupt changes of surface contour or local flow-interference between two adjacent surfaces.

The phenomenon could limit performance by restricting the usable load-factor and decreasing the lift capability of a wing. The buffeting limit and the maximum usable lift were normally designed for the pilot's comfort and for his ability to track another aircraft while experiencing buffeting. Because flight in the buffeting zone would normally be maintained in attempting to shake an enemy off one's tail, an aircraft had to be designed with a view to operating in that zone.

The onset of buffeting in the wing could be delayed by (a) selection of a proper aerofoil section; (b) reduction of wing thickness; (c) sweep-back of the wing leading-edge; (d) slats; and (e) proper detail design, i.e., flush riveting, butt joints, and the minimum number of holes, etc.

Stall Characteristics.—Satisfactory stalling characteristics had to be provided, since without them a pilot would be unwilling to fly his aircraft to its limits. Treacherous indications—such as excessive rolling or yawing, longitudinal "pitch-up," ineffectiveness of control and abrupt roll or differential stalling—should be avoided. Particular attention had to be paid to aerofoil section, taper ratio, aspect ratio, angle of sweep-back and spanwise aerodynamic twist.

Flight Controls.—Mr. Peterson emphasized that the control system of an aircraft required very careful design; not only must the controls be made capable of manœuvring the aircraft within the desired limits, but the operating loads for actuators and the complete control system assessed. These conditions must then be incorporated in the structural-loads analysis determining the required structural strength. It was therefore apparent that control movement loads must be accurately assessed in the design stage.

Critical control surface requirements could be enumerated as follows: (1) effectiveness at all Mach numbers, (2) power requirements, and (3) response rates. First and foremost came effectiveness. Insufficient effectiveness reduced manœuvrability; over-effectiveness rendered formation flying, or flying in rough air, too difficult. Flight at high Mach numbers normally led to a decrease in control effectiveness and to increased aircraft stability. High-speed conditions, therefore (rather than low speed as heretofore) established the maximum surface travel and areas required.

The speaker gave the following trends in control-design philosophy: (1) thin surfaces which provided improved high-speed characteristics by delaying flow separation; (2) low trailing-edge angles to assist surface effectiveness at high speed and to minimize abnormal hinge-moment variations; (3) a selection of plan forms providing the lowest overall lift-curve coefficients; and (4) full-chord controls (all-moving surfaces) to eliminate the low effectiveness of trailing edge controls at high speeds.

Once the layout of a surface was established, hinge-moment requirements had to be decided. Adequate power had to be provided to overcome the maximum anticipated air loads and actuator sizes chosen.

It would next have to be decided what pilot control forces were required during a typical mission. Pilot fatigue must be avoided, as well as stick-forces so light as to render structural damage to the airframe easily possible. If control forces were too high, manœuvrability would be restricted; too-light stick forces led to over-loading and inadvertent stalling.

Mr. Peterson listed the following methods of maintaining control forces at desired levels: (1) aerodynamic balance—generally satisfactory at low Mach numbers, but of rapidly decreasing effectiveness with increasing speed, owing to growing hinge-moments and lessening balance effectiveness; (2) servo or boost tabs—satisfactory at low and medium speeds, but subject to loss of effective-

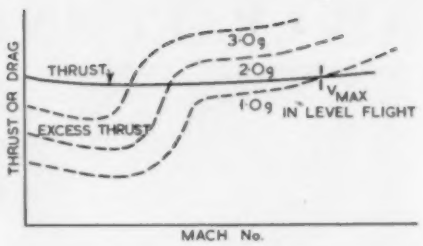
ness at high speeds; (3) hydraulic boost systems—effective at all Mach numbers, but still subject to surface hinge-moment variations; it was generally difficult, with these controls, to obtain suitable forces at high speed without abnormally low forces at low speed; (4) combinations of the above; (5) irreversible powered-control system with artificial feel (this was generally the most flexible system, since aerodynamic loads were not fed back to the pilot; centring springs provided stick-forces proportional to surface deflection and a bobweight provided feel proportional to load factor); and (6) variable kinematics—a gear-changing device to overcome the disadvantage of high stick-forces at high speed and low stick-forces at low speed or high altitude.

The rate of movement of a control surface had to conform to minimum rates laid down in government specifications and these minimum rates established the necessary pump and accumulator capacities. Such specifications, Mr. Peterson stated, were aimed at producing a specified rate of roll in a new aircraft. He claimed, however, that the specification should rather indicate the rate of roll desired than the rate of control deflection thought to be required to achieve that rate of roll. Thus it would be left to the manufacturer to achieve the rate as he best thought fit. The lecturer said that present specifications were to some extent taking this into account.

Speed Controls.—Apart from controls affecting the flight-path, it was almost mandatory in modern, highly streamlined aircraft to provide some means of deceleration as well as the required surplus thrust for good acceleration. Speed-brakes (air brakes) should be designed to have the minimum effect on handling characteristics and, if any trim change were caused, it should be in a "nose up" sense. Primary criteria for such devices should be adequate deceleration, ease and rapidity of control, and minimum trim change and buffeting. Short-term thrust augmentation devices should have the same criteria as the deceleration devices.

Basic Performance.—High performance should enable a pilot not only to close a target but to manœuvre into a position for effective attack. High performance, as distinct from manœuvrability, was therefore a vital characteristic of a good fighter. Performance was generally assessed according to maximum straight-and-level speed, rate of climb, climbing speed and ceiling. These characteristics were all governed by the thrust/drag ratio of the aircraft. Thrust/drag ratio had to be considered not only for level flight, but for flight in high-drag, high-g manœuvres. The graph [reproduced on this page] illustrated the effect of high g and therefore of high drag on the amount of excess thrust available. The thrust line was seen to intersect the drag lines at various values of forward speed for various g loadings. Up to a certain speed, a varying amount of excess thrust was available for acceleration and climb, but such excess thrust could also be used to maintain speed and height during high-g turns.

In combat between aircraft of almost equal capabilities on a direct speed and thrust basis, the aircraft with the lowest drag due to lift would possess the advantage. This advantage would be apparent as a smaller turning radius at a constant altitude, or as a lesser altitude loss in a diving turn of comparable radius to that of the opposing aircraft.



Maximum thrust plotted against drag for various speeds and values of g. Where drag is less than thrust, excess power remains for acceleration and climb.

From the foregoing, the speaker claimed that the drag due to lift was an extremely important factor in providing good manœuvrability. Such drag was basically a function of wing form, and was affected by aerofoil section, aspect ratio, taper ratio, and plan configuration. However, it was true to say that high-speed requirements for wing geometry (thin sections, small area, etc.) were detrimental to low drag. A compromise was to be sought between ultimate high speeds and lowest speed losses in turn. Slats assisted significantly in reducing drag due to lift.

Handling Characteristics.—In order to obtain the full designed manœuvrability, handling characteristics had to be satisfactory, i.e., the aircraft should not possess characteristics in normal or manœuvring flight requiring extreme pilot-skill, excessive control-column forces, or unnatural control movements. Similarly, the effectiveness of a given aircraft as a weapon would suffer if rapid losses of control effectiveness or excessive trim changes were encountered.

The matter, Mr. Peterson stated, was related generally to considerations of static stability. It was, however, also necessary to provide dynamic stability to ensure sufficient restoring forces and moments to damp out any disturbances. Target tracking, or flight in rough air, would otherwise be extremely difficult. But the present trend towards higher wing-loadings, high moments of inertia and higher altitudes adversely affected the dynamic characteristics of an aircraft, and such characteristics assumed a major importance in present design. Owing to the difficulty of designing good dynamic characteristics into an aircraft, artificial damping (auto-stabilizers) was provided for many modern aircraft. This generally took the form of a rate gyro feeding opposing control signals to counteract initial disturbances of the aircraft.

In conclusion, Mr. Peterson pointed out that manœuvrability was the result of numerous characteristics of the basic design features of a given aircraft. Proper attention to such details as they affected manœuvrability was the responsibility of the designer as the configuration was evolved. In most cases, he said, the ultimate assessment of the suitability of an aircraft, particularly in regard to manœuvrability, could only be made in actual combat.

G. TILGHMAN RICHARDS RETIRES

RETIRING this week, on reaching the age of 70, is Mr. G. Tilghman Richards, whose lectures at the Science Museum, on aeronautical and other subjects, must have been heard by tens of thousands over the past 25 years.

After extensive practical engineering and designing experience in his early years—at one period he was on car design work for Henry Royce at the munificent salary of 30s a week—he had his first contacts with aviation between 1908 and 1911, as a member of the Manchester Aero Club. At this period he became associated with Cedric Lee, who was developing the Kitchen annular-wing project. With Mr. Richards as designer, three prototypes of this unorthodox aircraft—since referred to as "the original flying saucer"—were built, the third achieving a measure of success that secured its demonstration—in the hands of Gordon Bell—before Mr. Winston Churchill and Lord French.

When the 1914-18 war broke out, Mr. Richards was one of the half-dozen free-lance designers who were commissioned in the R.N.A.S. as inspectors of Naval aircraft and allocated to various factories. Mr. Richards went to Wm. Beardmore's Dalmuir Works, where he presently became assistant manager and designer, having been permitted to resign his commission in order to do so.

After the war he was appointed general manager of Martinsyde, Ltd., and reorganized their works in a change-over from aircraft to motor cycles. That company's peacetime existence, however, was comparatively short-lived and, in 1924, with aircraft production at a low ebb almost everywhere, Mr. Richards was forced to seek a temporary post as a professional assistant at the Science Museum. This involved a certain amount of lecturing; he particularly liked this aspect of his work, and in 1933 he was established as official lecturer on the engineering and industrial collections. When due for retirement at 60 he was asked to continue, and again at 65. Now, at 70, he finally steps down; his many friends in aeronautical circles will wish him contentment and good health in his leisure years.

DECELONETS

ARRESTER nets are to be installed at a number of Swedish Air Force bases to stop aircraft in emergencies. The gear is described, in a report from Stockholm, as consisting of a "giant tennis net" of nylon stretched across the end of the runway and attached to cables wound on friction drums; it decelerates an aircraft in much the same way as do arrester wires on carriers. The Swedish nets will go into production in the summer. In the meantime, the night-fighter base at Västeras is equipped with a net attached to 18 nylon cables 50 metres long; presumably anchored at varying distances, the cables are said to break successively to stop a six-ton aircraft travelling at 60 m.p.h. in 165 yd. It may be assumed that actual breakage of the nylon cables does not occur, and that use is made of easily renewable weak-link anchorages.

An arrester gear used at Korean Sabre bases, was described in *Flight* of June 12th, 1953. Miles Aircraft, Ltd., first developed landing nets in 1943, a Messenger being successfully flown downwind into a net without damage; the airscrew was guided into a gap in the centre of the net.

The absence of airscrews on jet aircraft has greatly simplified the design of arrester nets, and increased landing speeds have now caused development to be renewed ten years after the first trials.

AIRCRAFT INTELLIGENCE

SEA AIR: (Top) A McDonnell F3H-1N Demon of the U.S. Navy leaving the deck of the carrier "Coral Sea" during evaluation tests. Note leading-edge slats, and auxiliary intake approximately in line with the wing-root leading edge. The lower picture shows the S.E.5000 Baroudeur on the beach at La Baule just before Christmas. Tail modifications are visible.

Great Britain

Short Seamew—Development Potential. Though classed as a "light" anti-submarine aircraft, the Seamew is evidently capable of being developed to carry a heavy external load in addition to its internally stowed stores. The primary requirement is increased power. This is likely to be met in the first instance by an up-rated Armstrong Siddeley Mamba.

France

Max Holste 1521 *Broussard.* Discussing the commercial aspect of this "French Beaver", the designer, Max Holste, said that the first examples will be for the Government. Later machines will be delivered commercially (from April this year) at about £14,000 apiece. The schedule is one aircraft per month until June, when two per month are due.

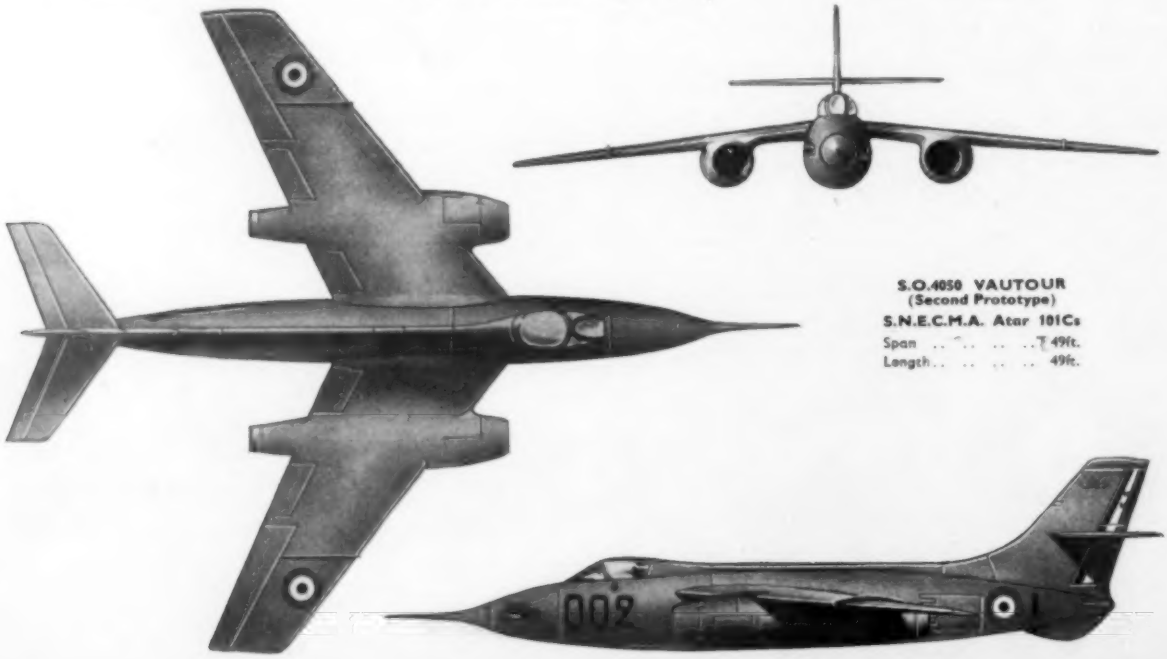
United States

Martin XP6M-1 Seamaster. The mock-up of this four-jet minelaying flying-boat, believed to be capable of speeds well in excess of 600 m.p.h., should be completed in June. First flight of the prototype is certainly more than a year away.

Convair R3Y-2. This U.S. Navy designation has been allocated to a development of the R3Y-1 Tradewind long-range transport turboprop flying-boat, to have bow-opening doors somewhat similar to those of the Douglas C-124, and to seat more than a hundred.

North American TF-86F. This two-seat tandem trainer version of the Sabre, illustrated last week, is designed to provide pilot-training in high-speed flight, gunnery and dive-bombing. The fuselage has been extended 63in between the nose and wing roots, and the wings have been moved forward 8in. Armament is two 0.5in machine guns. Unlike the F-86 fighter/bomber, the TF-86F uses the leading-edge slats of earlier Sabres. The power unit is a General Electric J47-GE-27. Equipment includes a special intercom. system, an omni-directional range receiver and I.L.S. In both front and rear cockpits the instrument panels are lower and broader than those of the single-seat F-86F. There are separate ejection controls for the clamshell-type cockpit canopy.

North American F-86D. Details of "vortex generators" on this all-weather single-seater are given by *Aviation Week.* They are in the form of tiny aerofoils and their purpose is to create a vortex pattern downstream of their location, thus re-energizing the boundary layer air and delaying separation of the flow from the surface. The only previous application announced was on the Boeing B-47 Stratojet. Ahead of the N.A.C.A. flush intakes in the sides of the fuselage, aft of the wing, the generators are either simple angle clips or T-section extrusions, riveted through the detachable panels in the vicinity of the intake. On the under side of the horizontal tail surfaces, and on the sides of the fuselage, in the same vicinity, the generators are cut from sheet and welded to a strip which is in turn either riveted or screwed to the skin panel. Apparently these modifications have so far applied only to the F-86D, and not to other Sabre variants.



S.O.4050 VAUTOUR
(Second Prototype)
S.N.E.C.M.A. Atar 101Cs
Span .. .. 49ft.
Length .. .. 49ft.

Air Power at Sea

H.M.S. ILLUSTRIOUS

The first ship to bear the name *Illustrious* was a 74-gun third-rate. Many of the famous 74's were originally three-deck ships but had the top deck removed and hence were known by the French term "Razees". They served the Navy in the eighteenth century. The fleet carrier *Illustrious* of 23,000 tons, her modern successor, is the fourth ship of that name. Armed with her striking force of naval aircraft, she upheld the highest traditions of the Royal Navy in battle after battle between 1939 and 1945. Operating from the oceans of the world, shipborne Fairey aircraft in *Illustrious* brought many combat successes to her long list of "Battle Honours".

In this great tradition Fairey Gannet anti-submarine aircraft are equipping front-line squadrons of the Fleet Air Arm.

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HERON

An Up-and-coming Transport in a Class of its Own

ORTHODOX though it is in general conception, de Havilland's Heron is an aircraft of absorbing interest. Time was when a light transport could be built, tested and certificated all within four months—as was the D.H.86 in 1934. The Heron is a direct descendant of the 86, and is designed for the same type of work, namely, carriage of passengers and freight on up-country or inter-island routes, where airfields and maintenance bases are not all they might be. The key to the Heron is its ability to operate like a 'bus, on services where frequency is as important as speed.

One cannot, of course, discuss the Heron without reference to the Dove. The Dove was conceived at the end of the war as—broadly speaking—a Rapide replacement, embodying every modern refinement, such as constant-speed, feathering airscrews, flaps and a retractable undercarriage. De Havillands also considered a larger, four-engined machine capable of taking heavier loads, but this project was temporarily shelved while the Dove was developed.

It was towards the end of 1948 that W. A. Tamblin, A.F.R.Ae.S., A.M.I.N.A., now in charge of design at de Havilland's Airspeed Division, finished the design of the Comet wing and turned his attention to the machine which has become known as the D.H.114 Heron. From the outset it was decided to follow Rapide design-thinking wherever possible, with the accent on simplicity rather than the attainment of the ultimate in efficiency.

As much of the Dove structure as possible was retained and, by permitting the use of Dove tooling, considerable financial savings resulted. Furthermore, much of the structure and most of the equipment had already been thoroughly tested and developed until, by the time the Heron prototype was built in 1949-50, it was virtually snag-free.

The account which follows deals first with the structure, then with the power units and equipment, and concludes with a brief historical review of the Heron's progress to date.

Structure. The Heron airframe is entirely of metal, and a simpler structure would be hard to conceive. Stress-bearing skins are made of artificially aged light-alloy, with Reduxed stringers and stiffeners. The remainder of the structure is riveted, snaphead rivets being employed throughout.

The wing is similar to that of the Dove, with an additional section carrying the inner engines. It is made in port and starboard halves which are cantilevered from each side of the fuselage. The main spar has a plate web and extruded booms, and is continuous from root to tip. The rear false spar, which carries the flap and aileron hinges, is of rolled sheet, and also extends from the root to tip. The front spar has a plate web and channel-section booms, and it is not continued beyond the outer engines.

Like the false spars, most of the ribs are simple sheet pressings. Strengthened ribs are provided at the power unit pick-ups, at the wing root, and at the flap-ram attachment, the latter also carrying the main jacking point. Reduxed stiffeners run along the trailing edge of the wing on upper and lower surfaces, and the inner leading edges are hinged to provide access to the engine controls mounted on the front spar. The oil coolers are also mounted in the wings, fed by air ducts from the leading edge, whereas those of the Dove are attached to the top of the engine crankcase with a ram intake behind the spinner.

The main undercarriage units are attached to stiff ribs and diaphragms to the rear of the inner engines. Outboard of this point lies the wheel bay, which in the fixed-undercarriage Heron I is left vacant. At the root the wing is attached to the fuselage at three points. The rear attachment is an aluminium-alloy forging used principally as a locating point. The main spar attachment is a stainless steel forging attached to a cross-piece built integral with the keel of the fuselage.

The fuselage is built in nose, cabin and rear sections, the nose and rear units being almost identical with those of the Dove. The centre fuselage is much longer in the Heron, an extra section with three windows on each side having been incorporated. Head-room has also been increased by the addition of a 6in-wide strip above the windows.

The nose, which extends back to the rear of the cockpit, is made on Dove jigs. Starting with the floor, to which transverse stringers are spot-welded, plate frames are added, the accumulator compartment built and shellaced, and the nose undercarriage castings attached. The front bulkhead is then inserted and the whole skinned up to the level of the cockpit windows. Before being attached to the rest of the aircraft the complete nose is largely finished, with instruments, radio, controls, pneumatic equipment, electrical junction boxes and fuses, and wiring and piping.

Some operators found the Dove cockpit overwarm in sunny climates. Accordion-pleated blinds and sunshields have been employed as a palliative and, in the Heron, an opaque glass-fibre roof is used, which also affords increased headroom. It is a product of the de Havilland plastics shop.

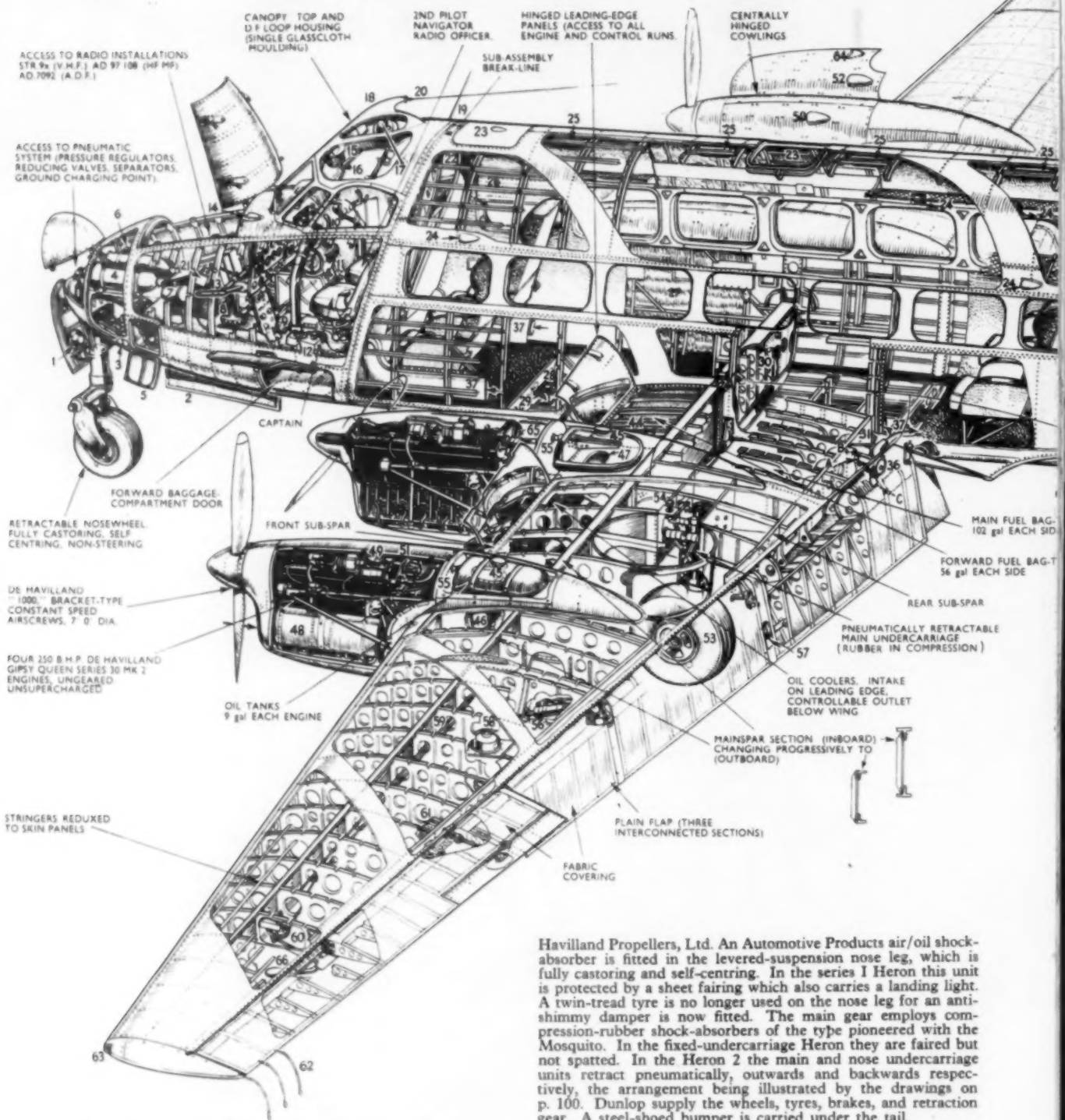
The cabin has, as a basis, a keel which forms the entire structure below floor level. The keel is built up of semi-frames and Reduxed longerons, the framelets being slotted for the numerous controls and fuel and pneumatic lines, access to which is provided by 12 doors in the skin. The two cabin walls are made in vertical jigs, the basis being a large formed sheet stiffened by channel frames and Reduxed top-hat stringers. Above this sheet run the seven large windows separated by light vertical pressed-sheet members. Between two of the wall frames the skin is cut out for the main entry door, the top and bottom of the opening being reinforced by riveted rolled sections. The roof is of similar construction and carries six interior lights and three escape hatches.

The keel, walls and roof are then removed from their jigs, and "boxed-up" with wooden bulkheads front and rear and straps tightened around the entire assembly at intervals while riveting is carried out. The rear fuselage is a simple structure which, like the nose-section, is riveted around its periphery to the assembled cabin. The fuselage is then insulated with glass wool and basic interior furnishing follows.

The fin and tailplane each have a swept front spar and a rear spar carrying control-surface hinges, both the spars and ribs being simple pressings. The fin is attached directly to the rear fuselage, but the tailplane is hinged to the rear fuselage bulkhead at the front spar and braced at the rear spar by tubular struts, the threaded sockets of which are adjustable on the ground so that the tailplane may be rigged.

All the control surfaces and flaps are straightforward light-

DE HAVILLAND HERON

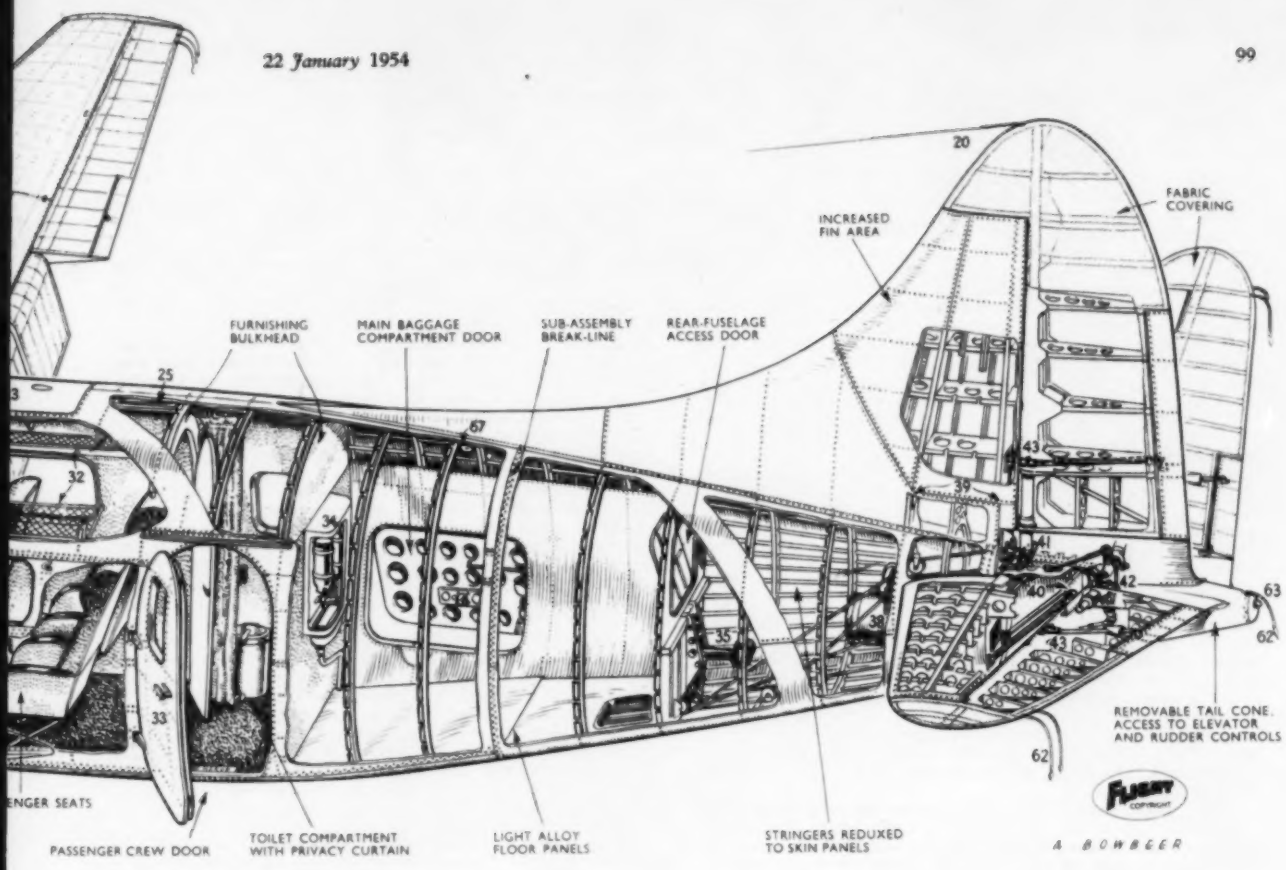

CANOPY TOP AND D.F. LOOP HOUSING (SINGLE GLASSCLOTH MOULDING)
2ND PILOT NAVIGATOR RADIO OFFICER.
HINGED LEADING-EDGE PANELS (ACCESS TO ALL ENGINE AND CONTROL RUNS.
CENTRALLY HINGED COWLINGS
ACCESS TO RADIO INSTALLATION: STR.9a (V.H.F.) AD 97/108 (H/F M/F) AD.7092 (A.D.F.)
SUB-ASSEMBLY BREAK-LINE
ACCESS TO PNEUMATIC SYSTEM (PRESSURE REGULATORS, REDUCING VALVES, SEPARATORS, GROUND CHARGING POINT).
CAPTAIN
FORWARD BAGGAGE COMPARTMENT DOOR
RETRACTABLE NOSEWHEEL FULLY CASTORING, SELF CENTRING, NON-STEERING
FRONT SUB-SPAR
MAIN FUEL BAG- 102 gal EACH SID
FORWARD FUEL BAG-T 56 gal EACH SIDE
REAR SUB-SPAR
DE HAVILLAND "1000" BRACKET-TYPE CONSTANT SPEED AIRSCREWS, 7' 0" DIA.
PNEUMATICALLY RETRACTABLE MAIN UNDERCARRIAGE (RUBBER IN COMPRESSION)
FOUR 250 B.H.P. DE HAVILLAND GIPSY QUEEN SERIES 30 MK 2 ENGINES, UNGEARED UNSUPERCHARGED
OIL COOLERS. INTAKE ON LEADING EDGE, CONTROLLABLE OUTLET BELOW WING
OIL TANKS 9 gal EACH ENGINE
MAINSPAR SECTION (INBOARD) CHANGING PROGRESSIVELY TO (OUTBOARD)
STRINGERS REDUXED TO SKIN PANELS
PLAIN FLAP (THREE INTERCONNECTED SECTIONS)
FABRIC COVERING

alloy structures, with D-noses, pressed ribs and fabric covering. In service, the fabric covering is wearing well, and even on the flaps behind the main wheels—where several layers of fabric are used—is not proving excessively prone to damage.

The tricycle undercarriage is very similar to that of the Dove, but is stressed for the Heron's greater all-up weight. Light-alloy forged legs are used, supplied by the Lostock works of de Havilland Propellers, Ltd. An Automotive Products air/oil shock-absorber is fitted in the levered-suspension nose leg, which is fully castoring and self-centring. In the series I Heron this unit is protected by a sheet fairing which also carries a landing light. A twin-tread tyre is no longer used on the nose leg for an anti-shimmy damper is now fitted. The main gear employs compression-rubber shock-absorbers of the type pioneered with the Mosquito. In the fixed-undercarriage Heron they are faired but not spatted. In the Heron 2 the main and nose undercarriage units retract pneumatically, outwards and backwards respectively, the arrangement being illustrated by the drawings on p. 100. Dunlop supply the wheels, tyres, brakes, and retraction gear. A steel-shoed bumper is carried under the tail.

A final note on the Heron structure: before painting, all the company's metal aircraft are burnished all over with portable buffing wheels and a fine abrasive. The distinctive mirror-like finish which results is quite remarkable.

Power Plant. The Heron is fitted with four de Havilland Gipsy Queen 30 Mk 2 engines, giving 250 h.p. each for take-off. Selection of this engine, which is ungeared and unsuper-



charged, is in line with the design policy for the aircraft. Certainly Dove engines would offer a great increase in performance, but highly tuned engines of this nature have not always been the best choice for operation in the "out-back."

Although the Queen 70 engines of the Dove are installed as power plants, complete with accessories and cowlings, the Heron engines are supplied bare, and are installed in the airframe in what might be termed "classical" manner. Each engine rests in a pair of welded-steel-tube mounts attached to the wing by four bolts. The engines are all interchangeable port and starboard, apart from easily removed accessories. This arrangement is again likely to appeal to operators off the main air routes: such customers generally prefer to buy a basic engine and equip it themselves rather than have an expensive and rather inflexible power unit. In any case, the self-contained power plant is often misused in that, were an engine-driven pump to fail, the pump would usually be changed—probably by robbing a spare power unit—rather than the engine itself.

The Heron airscrew is of the well-known 1000-size D.H. bracket type, which has been made by the company since 1935 in almost unchanged form. The adoption of this airscrew, which is non-feathering and non-braking, was made possible by the remarkable record of the Gipsy Queen. In 1½ million hours on four selected types powered by the Gipsy Six or Queen 30 there had been no case of fire in the air, nor any report of serious consequences following the windmilling of an engine. Nevertheless, fire protection is exceptionally complete. A Graviner methyl-bromide installation is standard.

It is interesting to note that two years ago de Havilland developed a feathering version of the Heron airscrew but, as yet, no operator has asked for it.

In the interests of simplicity, economy, and—in all probability—pilot preference, the engine power levers and airscrew-pitch controls are so linked as to provide for single-lever operation. In this manner, the standard Dove control pedestal is retained. Movement of the levers automatically adjusts the constant-speed units, and hence the engine r.p.m., to maintain optimum conditions for the manifold pressure selected. The system was described in detail in *Flight* of August 17th, 1951.

The Queen 30 is equipped with standard British accessories, the electric starter, magnetos and distributors being of B.T.H. manufacture, and the carburettors Hobson downdraught units. Bearings are of the Vandervell thin-wall type.

Little need be said regarding the handling and flying characteristics of the Heron, which are quite straightforward. The

KEY TO DRAWING OF THE HERON 1

(1) Taxying lamp on nosewheel forward door, (2) Nosewheel main door, (3) A.S.I. static-pressure aperture, (4) Air bottles, (5) Sperry 1a gyropilot—batteries in corresponding position to starboard, (6) Ground starter socket, (7) Windscreen de-icing fluid tank, (8) Rudder pedals, (9) Rudder control locking bar, (10) Control column—starboard optional, (11) Central control console, (12) Engine priming panel, (13) Pitot head, (14) Cool air to cockpit, (15) P.12 magnetic compass, (16) Direct-vision panel, open, (17) V.H.F. STR.9X whip aerial, (18) D.F. loop aerial type 1264, (19) D.F. sense aerial, (20) H.F./M.F. fixed aerial, (21) Pneumatic brake differential-unit, (22) Cockpit/cabin door, (23) Escape hatches, (24) Cool air to passengers' louvres, (25) Cabin lights, (26) Sun blinds, (27) Glass-fibre soundproofing, (28) Cables and controls under floor, (29), Thirteen inspection panels in lower skin, (30) Mainspar centre-section carrying wing pick-up forgings, (31) Rear sub-spar pick-up point, (32) Light-luggage racks, (33) First-aid pack in door, (34) Liquid-dispensers, (35) Elevator stability weight, (36) Cabin warm-air control valve—A, hot air from inner exhausts; B, cold-air inlet; C, hot-air spill, (37) Warm air delivery duct, (38) Airscrew de-icing fluid tank, (39) Fin mounting points, (40) Tailplane mounting points, (41) Rudder control, (42) Elevator control, (43) Trim-tab screw-jacks, (44) Fuel filler—serves both port tanks, (45) Oil filler, (46) Oil tank "hot-pot", (47) Aperture in upper skin for 46, (48) Engine cooling-air duct, (49) 28-V 35-A generator, outer engines only, (50) Generator cooling-air intake, (51) Air compressor, outer engines only, (52) Compressor air intake, (53) Pneumatic wheel-brakes, (54) Undercarriage position indicator, (55) Firewall, (56) Pneumatic flap-jack, (57) Flap connecting link, (58) Landing lamp, retracted, (59) Aileron control cables, (60) Aileron differential pulley, (61) Eleven-position tab-setting bracket, (62) Static dischargers, (63) Navigation lights, (64) Carburettor air intake, (65) Vacuum pump, inner engines only, (66) Mass balance and central hinge, (67) Baggage-compartment light.

The Gipsy Queen 30 Mk 2 with large doors hinged on top at the centre-line. Note the ram intake for exhaust-heated cabin air.

de Havilland HERON . . .

Heron I was the subject of an "In the Air" description in our issue of August 3rd, 1951.

Equipment. Like the Dove, the Heron has no hydraulic system, and flaps and brakes (and in the Series 2 the undercarriage) are operated pneumatically. Each outboard engine carries an air compressor which charges the twin bottles in the fuselage nose. An upward-hinging nose door, which carries an instructional panel including a system chart, provides access to the bottles and associated components. A notable feature is that the system can be used to inflate the tyres and nose oleo by means of the charging hose.

In each wing between the spars is a flexible bag fuel tank with a capacity of 102 Imperial gallons. These tanks and the system itself are quite conventional. For long ranges additional 56-gallon bag tanks can be mounted in each wing forward of the spar, and also a 52-gallon tank in the rear fuselage. S.P.E. fuel pumps are used. A 9-gallon oil tank is situated behind each engine in the upper part of the nacelles.

Electrical power is provided by a D.C. system operating at 24-28 volts. Two accumulators are mounted on sliding racks in the nose of the fuselage, charged by 1,000-watt Rotax generators mounted on the outer engines. As on the Dove, the whole system is completely accessible, and is designed for maintenance in remote areas. Circuit breakers are employed instead of fuses.

Flying controls have simple manual cable-operation, the cable runs being accessible throughout their length. A Sperry 1a gyro-pilot can be fitted in an *ad hoc* bay in the fuselage nose, but other autopilot systems can be employed if required. The Heron cockpit shown in the diagram on p. 10 is generally similar to that of the Dove and, although a trifle small for the largest pilots, is comfortable and offers an excellent view. A Sperry artificial horizon and direction indicator is standard, as are Sangamo Weston oil, pressure and temperature gauges, and air and oil thermometer bulbs. The remaining instrumentation is, like that of the Dove, almost entirely by the Smiths/Kelvin Hughes group.

Access to the back of the panels and to the radio is obtained through the top of the nose. Various radio equipment can be provided, most customers being glad to use the "miniaturized" Marconi equipment developed for the Dove, which includes the AD.97/108 communications equipment, and AD.7092 radio compass. The usual V.H.F. set is the standard S.T.R. 9X, and a Marconi blind-approach receiver is sometimes specified.

De-icing equipment, if fitted, takes the form of Goodyear pulsating elements on wings and tail, fed from the pressure (exhaust) side of the vacuum pumps on the inner engines. Fluid de-icing can be provided for the airscrews and windscreen, the former also using vacuum-pump pressure, and the latter being under manual control.

The cabin is, in general, about 4ft 6in wide by 5ft 8½in high, and has a usable length of 19ft. The general layout is clearly shown in the accompanying drawings; baggage holds fore and aft are provided and, by moving the interior bulkheads, a variety of seat arrangements is possible. With toilet fitted, 14 passengers is a normal load, although many operators depart from this figure to a greater or lesser extent. Quickly detachable seats are fitted at 32in pitch, the pattern being of D.H. design and manufacture of the type used in the Dove. Each passenger has the use of an individual ram-air ventilator. The pilot has control of the hot/cold cabin air valve, by which hot air is led into the cabin at foot level from heat-exchangers in the engine exhaust pipes.

The windows deserve special mention. Several disinterested bodies have found a direct relationship between passenger view and window size and the incidence of airsickness. It is doubtful if any other aircraft has so much window area per passenger as the Heron—which, rather disrespectfully, has become known in the works as "Tam's tram" after its designer. Each window is a single panel and is provided with a roller blind.

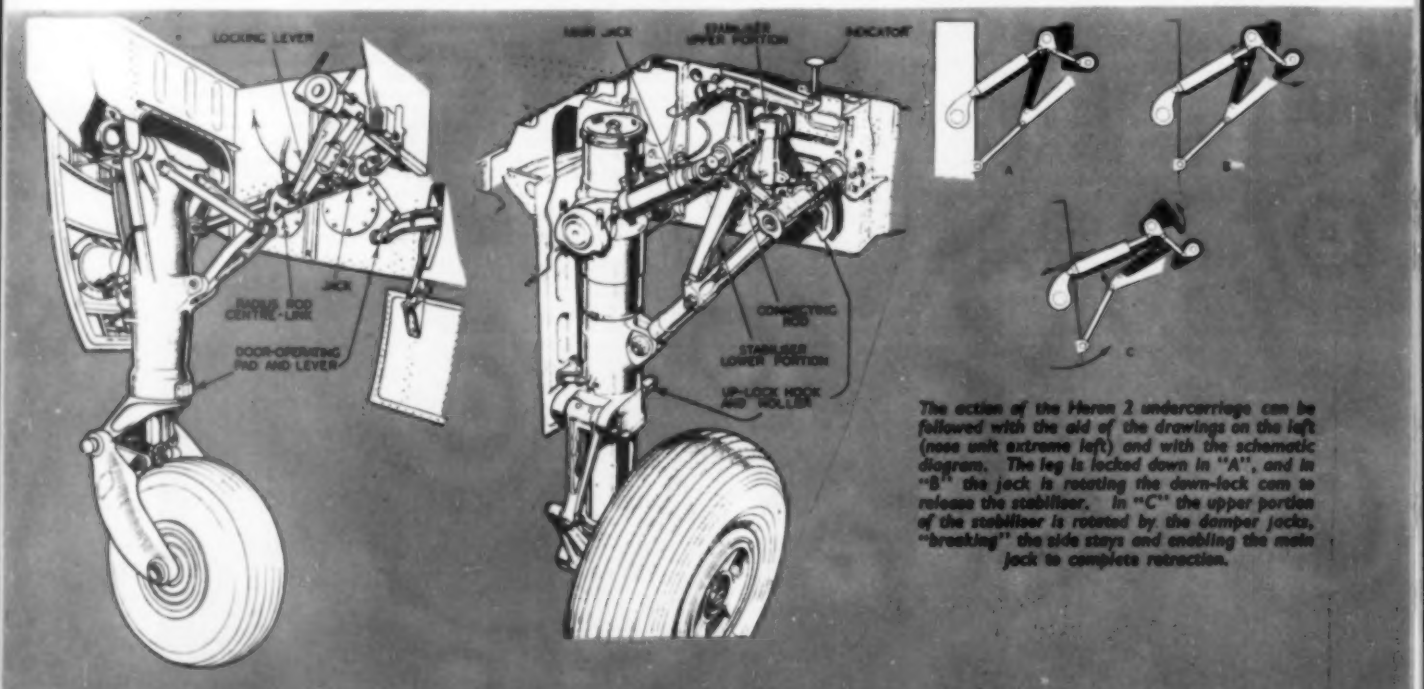
Heron History and Operations. In 1948, when Heron design began in earnest, the de Havilland Aircraft Company took over the former Vickers Armstrongs' Wellington plant at Chester. It is now the general policy of the company to carry design and development at Hatfield to the point at which the production can be farmed out to the Chester factory.

The Heron prototype flew in the spring of 1950. Later in that year it appeared at Farnborough and was then demonstrated at the Chester factory, where Dove production was in full swing. Built on production Dove jigs wherever possible, this aircraft G-ALZL differed but little from its successors. Two major airframe modifications adopted in production Herons were the incorporation of a much larger rear baggage hold (135 cu ft) with a bigger door, and a revised tailplane with a dihedral angle of 13 deg to cure fore-and-aft instability which had been experienced at low speeds.

To get the Heron completely "productionized" the first seven were built at Hatfield—six series 1s and the prototype series 2. Comet production then took over almost the entire Hatfield floor-space, and Herons and Doves have since been built at Chester on parallel lines. A number of jigs were brought from Hatfield, and parts of the airframe were originally sub-contracted. Present Herons are almost entirely built at the Chester factory, and many of the "imported" parts are of D.H. manufacture. The engines come from D.H. Leavesden, the undercarriage and airscrews from D.H. Lostock, and some of the Reduxing is carried out at Hatfield.

One of the first operators to express interest in the Heron was New Zealand National Airways Corporation, who were in 1950 looking for a machine capable of operating from Rongotai airfield, four miles from Wellington. One of the most difficult aerodromes in the world owing to small area, mountainous surroundings and turbulent winds, Rongotai was closed to civil traffic in 1947, to be replaced by Paraparaumu, a full 35 miles from the city. After completing tropical trials (85 hr at Khartoum) the prototype ZL was demonstrated to N.Z.N.A.C., and to other likely customers in the Far East.

The first order was placed in 1951, the operator being Braathens S.A.F.E. Airtransport, of Norway. The first of two Herons began work there on August 18th, 1952, and a third is on order. To a number of Norwegian towns, the Braathens' Herons have opened an air service for the first time; no other machine could meet the requirements of optimum capacity and ability to operate from small, inexpensive strips. Of particular note is the fact that one Heron can maintain three return services daily



The action of the Heron 2 undercarriage can be followed with the aid of the drawings on the left (nose unit extreme left) and with the schematic diagram. The leg is locked down in "A", and in "B" the jack is rotating the down-lock cam to release the stabiliser. In "C" the upper portion of the stabiliser is rotated by the damper jacks, "breaking" the side stays and enabling the main jack to complete retraction.

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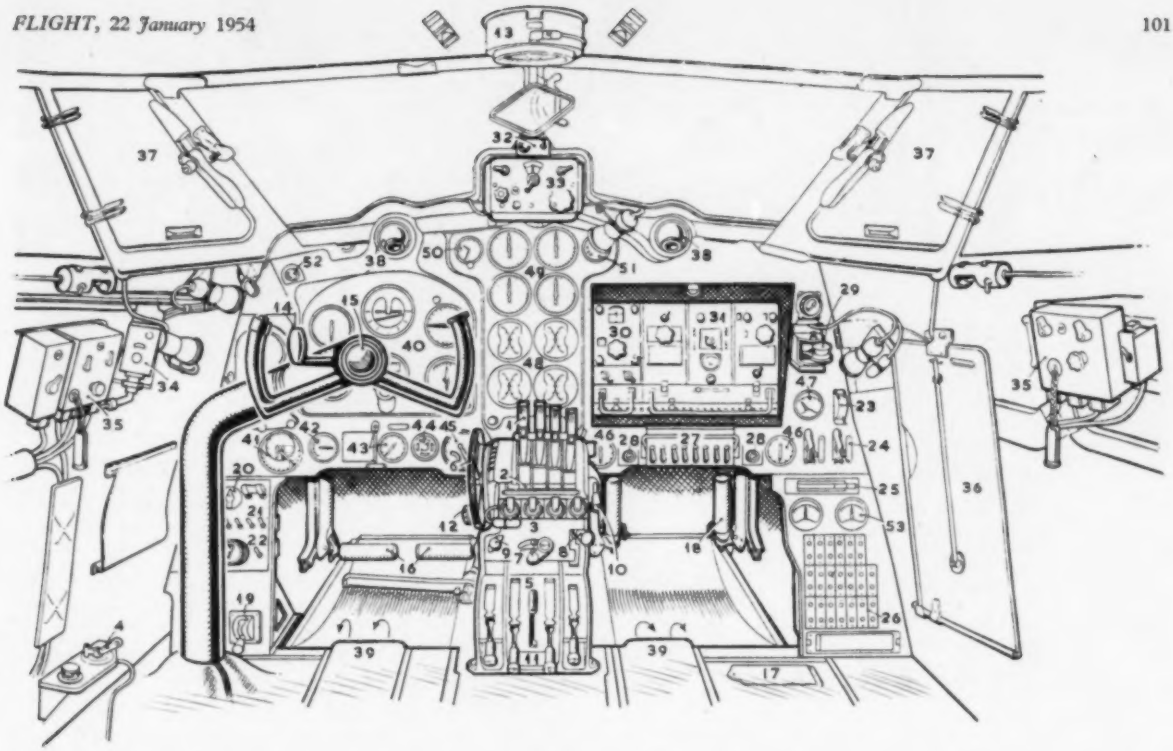


THE HERON'S COCKPIT: (1) Throttles—connected to airscrew constant-speed control, (2) Positive coarse-pitch stops, (3) Engine starter pushes, (4) Ki-Gass primer and selector, (5) Fuel and oil cocks, (6) Elevator trim, (7) Rudder trim, (8) Flap control—up, 20°, 60°, down, (9) Undercarriage selector, (10) Throttle friction, (11) Carburettor hot air, (12) Compass dimmer, (13) P.12 magnetic compass, (14) Brake lever, (15) Parking-brake knob, (16) Adjustable rudder-pedals, (17) Locking lever, starboard control column, (18) Starboard rudder pedals, stowed, (19) Master air valve, (20) Landing light retraction and filament switches, (21) Fuel-pump switches, (22) Dash-light dimmers, (23) Emergency undercarriage retraction, (24) Generator switches, (25) Ground/flight switch, (26) Circuit-breakers, (27) Magneto switches, (28) Booster-pump warning light, (29) Morse key, (30) AD. 108 receiver, (31) AD. 97 transmitter, (32) Fan-marker lamp and switch, (33) A.D.F. control, (34) V.H.F. control unit, (35) Mixing boxes, (36) Chart plotting table, stowed, (37) Direct-vision panels, (38) Cool air, (39) Warm air, (40) Standard blind-flying panel, (41) Pneumatic supply/brake pressure, (42) Flap position, (43) Vacuum system cock and gauge, (44) Undercarriage position, (45) A.D.F. bearing indicator, (46) Fuel contents gauge, (47) Air temperature, (48) Oil pressure, (49) Manifold pressure, (50) Clock, (51) Synchroscope, (52) Undercarriage warning light, (53) Ammeters.

de Havilland HERON . . .

between Stavanger and Oslo, involving nine hours' flying—but, according to Mr. Braathen, "such a utilization, which means that the aircraft would be flying continuously with only short ground stops from 9 o'clock in the morning until midnight, is quite feasible, as snags have been few and the maintenance easy." Other points arising from this operator are the authorization of the pilot to carry out A and B maintenance at stations without a qualified mechanic, and the ability of the Heron to use Oslo airport in conditions which ground other aircraft—one kilometre visibility and 100 metres cloud-base.

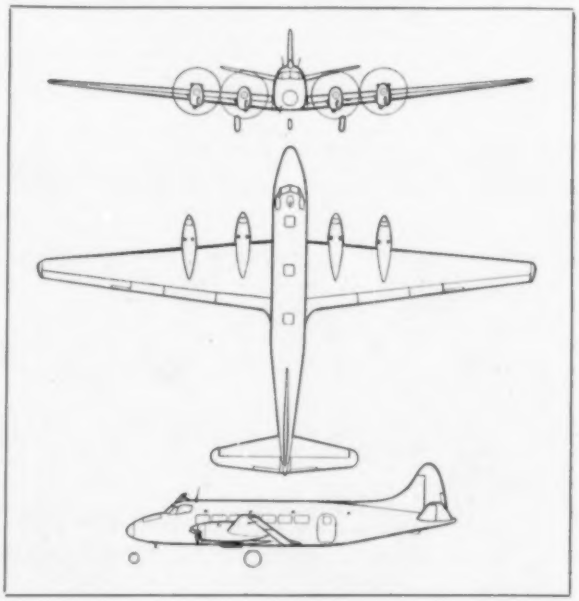
Later in 1951 came an order from Transportes Aéreos Salvador, based at the capital of the state of Bahia, Brazil. A T.A.S. Heron is shown on p. 102 and the company's routes serve many towns, some having only inferior landing strips; Itubera, for example, has a maximum length of 700 yd, with an approach over the mountains and take-off over the sea. The company carries heavy loads of passengers and freight, and has found that the Heron can compete successfully with Panagra's DC-3s. No service has ever been cancelled through unserviceability.

Preceding T.A.S. in putting the Heron in service were Butler Air Transport, whose many services to outback New South Wales were described in our issue of November 27th last. B.A.T.'s Heron *Warrawee* had, from its first service in November 1952 until the end of July last year, completed 1,191 hr—an average of nearly 7½ hr per day—at a very high load factor.

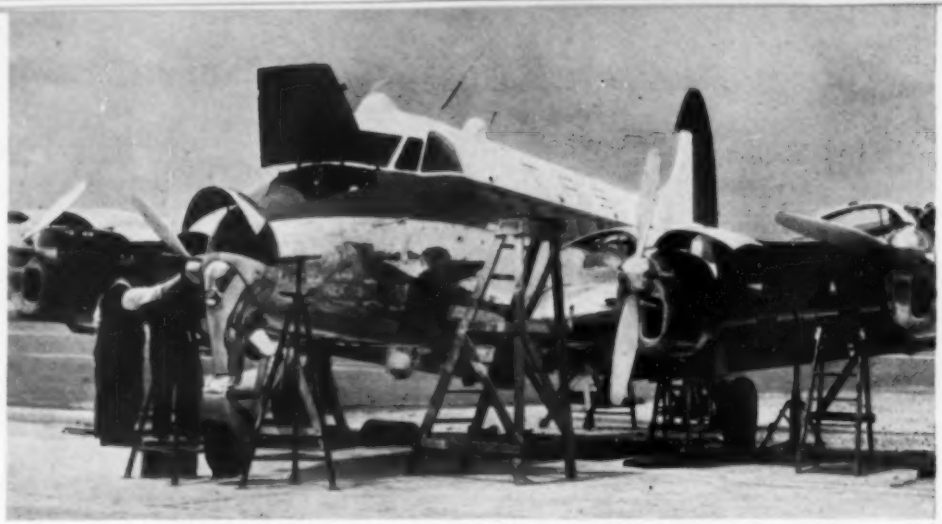
Herons have, since February last year, been based at Douala, capital of the French Cameroons, in the service of Union Aéromaritime de Transport. Four operate an extensive network in Central and West Africa, offering an *aérobus* service which carries heavy traffic; in particular, timetables are arranged to connect with U.A.T.'s Comets to France. A fact which may not be readily apparent is the ability of the Heron to do the work of DC-3s, for many of the latter were bought only because they were cheap and are operated at a low load-factor. In fact, on the Douala-Yaoundé route U.A.T.'s Herons are said to have run competing D.C.-3s out of business. Five more Herons are on order.

In New Zealand, N.Z.N.A.C. have worked Herons for nearly a year, particularly on the Cook Strait crossing between North and South Island. Many thousands of passengers have been carried in the Corporation's four Herons, which have made a great impression of reliable service. One of these Herons has been especially honoured for it carried Her Majesty the Queen and the Duke of Edinburgh from Rotorua to Gisborne earlier this month. The Royal crew and the interior of this Heron were shown on p. 53 of our January 8th issue.

A particularly good-looking Heron is that belonging to Jersey Airlines. It is unusual practice to attempt to serve a busy



de Havilland HERON . . .



This domestic scene illustrates the unusual accessibility of the Heron: almost everything is reached from ground level, and staging is kept to a minimum. The aircraft belongs to T.A.S., of Salvador, Brazil.

network of routes with a single aircraft, particularly in the face of heavy advance bookings. Jersey Airlines have had "exceptionally good service" from their Heron, which has averaged about five hours a day since it was delivered, with a normal load of about 12 passengers. Normally, the pilot flies the aircraft alone. Other Herons are on order.

Biggest operators of the Heron will shortly be Garuda Indonesian Airways, whose fleet of 14 has been built and will shortly be in full service. Based at Djakarta, they will fly to towns and cities throughout the entire 3,000 mile chain of the Indonesian islands. They are rather non-standard aircraft, with a crew of three (one under instruction). Radio includes American Collins and Bendix sets, some of which are mounted facing the port front seat in the passenger cabin. Garuda seats are Vynide covered, and the aircraft are arranged with a very large freight hold on each side of the rear cabin; if required, the bulkhead can be brought forward to leave the entire cabin aft of the spar clear for cargo. K.L.M. inspect and deliver these Herons, and they were agreeably surprised to find the Garuda Herons exceeded the published performance.

The Heron will soon be feeding the Comets of Japan Air Lines, resplendent in J.A.L.'s dark blue, dark red and white livery. More Herons are entering service with P.L.U.N.A. (Uruguay), and other airlines. Air delivery is usual, except to South America, in which the long haul round the N. Atlantic cuts into the life of the engines excessively. De Havilland train as many crews as the purchaser cares to send to this country. A training period of up to a month is usually ample, after which the crew ferry the aircraft out. Alternatively, the machines are ferried under contract, frequently by Silver City.

The Heron 2. So far no special mention has been made of the Heron 2, although this is the version depicted in our drawings. It is identical with the earlier machine except for the retracting undercarriage, shown in detail on p. 100. It complements, and does not supersede, the Heron 1, and is particularly good on longer stages, operators of which are usually prepared for a more complex aircraft. As shown by the cost/ton-mile curves it is very competitive and appeals, in particular, to North American operators—for whom it is seen as a potential "executive" aircraft. Sales in the U.S.A. await a decision by the Republican administration regarding purchase of company aircraft largely out of excess profits—a former Truman arrangement under which many Doves were sold. Canada is another likely market, and a Heron 2 has already been bought by Canadian Comstock—a civil engineering firm—to supplement their Dove. It has also been unofficially reported that a special Series 2 aircraft will be supplied to H.R.H. the Duke of Edinburgh.

The only recent Heron modification is a slight increase in the area of the dorsal fin. Overhaul life of the Queen 30 has risen steadily from 400 hr to twice this figure, and should shortly be extended to 1,000 hr.

Owing to its exceptionally good take-off and landing performance the Heron is able, with at least comparable safety, to work from "Rapide-size" fields. But, unfortunately, the Heron cannot be sold as a fleet-replacement type to operators of routes where the Rapide is the only aircraft capable of flying—such as the Scilly Isles. This is because, owing to its excellent record, the Rapide continues to be licensed under the less-strict pre-war requirements in much the same manner as the DC-3. The Heron, on the other hand, has to comply with the latest British performance standards, laid down in 1952 for new transport aircraft of all types, which probably comprise the strictest requirements enforced anywhere in the world.

Although conventional in the extreme, the Heron appears to be what the customer wants; for every operator with experience of the Heron has, like Oliver Twist, come back for more.

DE HAVILLAND HERON

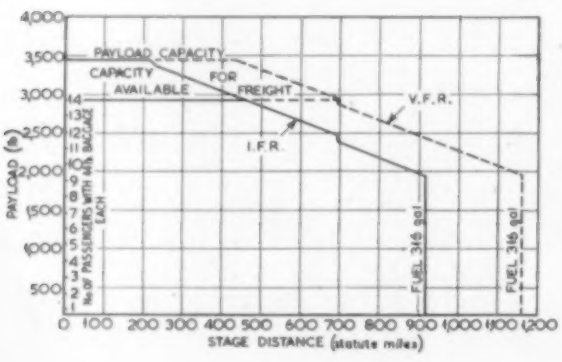
Four de Havilland Gipsy Queen 30 Mk 2 Engines

Dimensions and Weights.—Span, 71ft 6in; length, 48ft 6in; height, 15ft 7in; gross wing area, 499 sq ft; tare weight, 8,015-8,047 lb (Series 1, 165 lb less); all-up weight, 13,000 lb; wing loading, 26 lb/sq ft; power loading, 13 lb/b.h.p.

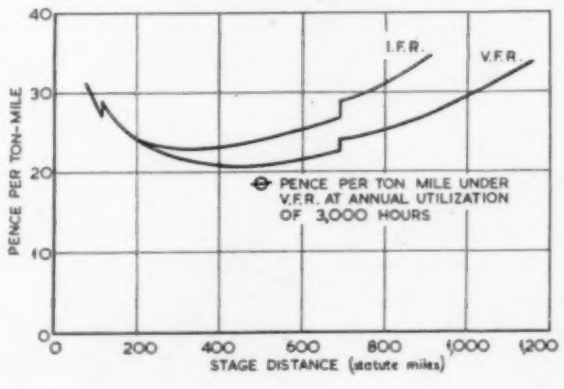
Performance (at 13,000 lb in I.S.A., unless otherwise stated).—Take-off to 50ft (hard runway, 20 deg flap, airline procedure, still air at sea level); 750yd, or 865yd with failure of critical engine at safety speed; climb (sea level, take-off power, 20 deg flap), 930ft/min (Series 1, 880ft/min); *en route* climb at sea level, 1,140ft/min (Series 1, 1,060ft/min); *en route* climb with one airscrew windmilling in coarse pitch, 610ft/min (Series 1, 550ft/min); service ceiling, 18,000ft (Series 1, 16,000ft); typical cruise condition (2,100 r.p.m., at 12,500 lb at 8,000ft), 183 m.p.h. with consumption 4.31 miles per gallon (Series 1, 165 m.p.h. at 3.92 m.p.g.); power-off stall at 13,000 lb with 60 deg flap, 73 m.p.h.; landing from 50ft in still air at sea level with 60 deg flap at 12,500 lb, 665yd.

Note: The above performance is obtained with adherence to standard airline procedure; if this is disregarded, even better figures are attainable, particularly in regard to take-off and landing.

Payload/stage-distance performance of the Heron 2. They are based upon use of about 65 per cent M.E.T.O. power at 8,000ft, giving a T.A.S. of 183 m.p.h. At this speed, the Heron 2 can beat DC-3 schedules.



Curves of direct operating cost for the Heron 2, based on an assumed utilization of 1,500 hr per annum. Most Herons in service are being worked at nearly double this rate.



He'll be in Salisbury (Rhodesia) in two days

He will shortly be boarding an R.A.F. transport 'plane to take up a new posting, perhaps as an instructor on training aircraft. If he *is* air-crew, he knows how much the safety of his flight to Africa (and of all the other hours he has logged) depends on Smiths instruments.

Of the many Smiths instruments, one he may not have come across is the Maximum Safe A.S.I. This is specially designed for high speed aircraft to indicate the safety factor existing at any speed or altitude. It gives simultaneously a reading of the indicated airspeed and the maximum safe airspeed permitted. To facilitate reading during approach and landing the scale is 'opened' at the lower ranges.

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CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

The Sopwith Pup

IN his excellent article on the Sopwith Pup in *Flight* of January 1st, Mr. J. M. Bruce refers to the little 50 h.p. "Hawker's runabout" which was, in effect, the prototype of this superb aircraft.

I feel sure that your readers will be interested to know that the original runabout was still flying in 1925, when it was owned by Mr. R. C. Shelley, who kindly gave me the enclosed photographs of it for my *History of the Sopwith Company*.

It was, as Mr. Bruce states, very similar to the Pup, except for its vertical centre-section struts and its warping wings. It carried the name *Flycatcher* on its fuselage. A brass plate on its instrument board identified it as

Machine type	SL. T. B. P.
Engine	50 h.p. Gnôme
No.	476

Another plate gave details of the engine, as follows: "Rebuilt by F. W. Berwick & Co., Ltd. H.P., 45.24. Petrol, 33 pints per hour. Oil, 13 pints per hour. Revs. 1,242. 6-8-1916. 50 h.p. Gnôme. Type Ω No. [683] 3831."

I wonder if Mr. Bruce is right in saying that the Bee had a 50 h.p. Gnôme? My notes give it the same engine as the production Pup—an 80 h.p. Gnôme. This seems logical in view of the fact that it was, basically, a "sawn-off" Pup, used by Hawker for aerobatic displays, and not merely a runabout. As a point of interest, I understand that at one stage of its career this diminutive aircraft, which was sometimes called the "Tadpole," was fitted with a single Vickers gun and sent away for trials as a fighter. But nobody took it very seriously!

Surbiton, Surrey. JOHN W. R. TAYLOR.

I WAS greatly interested in Mr. J. M. Bruce's article on the Sopwith Pup, as it disclosed further information concerning H. G. Hawker's prototype 50 h.p. Gnôme machine. This machine, of which I have photographs, I acquired in 1925 (Engine No. 683-3831); it was then painted all over in black and white stripes. Could this have been the machine mentioned as being at Gosport?

Perhaps some of your readers could let me have further information on the flights which it made.

Billericay, Essex. R. C. SHELLEY.

MAY I claim a little of your space to congratulate J. M. Bruce on yet another brilliant addition to his series?

Having carried out a little work on the same lines myself, I am led to the conclusion that fewer Pup photographs are in existence than of other types contemporary to it: a fact which seems to be borne out in the article illustrations. Yet I wonder how many of your readers have such photographs lying in half-forgotten private collections?

Croydon, Surrey. PETER G. COOKSLEY.

MAY I add my congratulations to those of your other readers, concerning the present series of "Historic Military Aircraft" now appearing in *Flight*? In particular, I would refer to your contributor's article on the Sopwith Pup.

It was my privilege to be in at the birth of this prodigy of the Sopwith Company and I well remember glancing at some chalk outlines on the shop floor, following a gathering of the "heads." If my memory serves me correctly, there were present on that historic occasion Sir T. O. M. Sopwith and Messrs. Hawker, Sigrist, Kauper and Smith. Shortly afterwards, the forerunner of the "Pup" took shape.

The shop floor was that of the original corrugated iron building in Canbury Park Road, Kingston-on-Thames, and I cannot help but wonder whether those apprentices who today pass over this hallowed spot realize on what sacred ground they tread.

As your contributor points out, the prototype differed from the production Pups in the manner in which the centre-section was carried on vertical struts instead of the splayed struts of later design.

The 50 h.p. Gnôme was successively replaced by the 80 h.p. Le Rhone and finally the 100 h.p. Monosoupape Gnôme.

We apprentices of those days were immensely proud of the Pup, and it was our delight to be detailed to Brooklands to assist in erection and flight-testing of these, *our* products. I think it was this pride in the Pup which fixed the choice on this machine as the central *motif* of the shield presented annually to the senior Hawker apprentice by the ex-Sopwith apprentices of those days.

If the Pup was the direct ascendant of the 1½-strutter, I think it only fair to say that the latter was derived from a machine known to us as the "Sigrist Bus." This machine carried a centre-section of exactly similar design to the 1½-strutter, was a two-seater, and remained long neglected whilst production centred on the Scout seaplane. On completion it was duly flown, and many and curious were the methods employed to vary its centre of gravity; but that is another story.

Your contributor's concluding remark, "It looked right and it was right," was, I think, derived from a quotation of the late C. G. Grey, which was to the effect that "if a machine looked right it probably was right"; and the Pup certainly fully justified this remark.

With good wishes to your excellent journal and continued success to what was originally the Hawker Engineering Company.

London, S.W.14. J. H. WILLIAMS.

MANY thanks to *Flight* and Mr. Bruce on the Sopwith Pup article of January 1st. It was very well written and presented. I think these articles are of great importance to the younger generation in showing that flying is not all 650 m.p.h. and jet propulsion! In conversation with many of them I have discovered that their knowledge only begins with post-war planes and engines.

Colchester, Essex. LESLIE A. ROGERS.

Training Pilots for the Airlines

HAVING read the article (January 8th) by David Meager and those by the other participants in this bitter verbal struggle, and being an ex-Service pilot myself, I fail to understand why so much emphasis should be laid on the differences between Service and civilian pilots. Each, in his own way, knows more than the other and one cannot honestly say that either is the better man.

To overcome this apparent animosity and to provide a constant flow of pilots to both sides would it not be possible to integrate the training requirements to a common level? The embryo pilots would thereby be trained to a standard agreed upon by R.A.F. and civil airline officials; and, though each would learn more than necessary, the airline pilot mastering aerobatics, etc., and the Service pilot flying to rule, etc., it would surely do neither of them any harm and would certainly result in a better understanding of "the other fellow's point of view."

From an economic standpoint the R.A.F., with its greater resources, would be responsible for providing the necessary facilities for training and the resultant pilots assessed for R.A.F. or civil flying in the same way that Service pilots are posted to the

PROTOTYPE PUP (50 h.p. Gnôme), referred to above in the letters from Mr. John W. R. Taylor and Mr. R. C. Shelley. It was still flying, in the latter's possession, in 1925. On the right is an autographed portrait of H. G. Hawker, provided by Mr. J. H. Williams, whose letter also appears above.

CORRESPONDENCE . . .

various commands. The best man would thus get the best job.

As an ex-Service pilot I know that it would benefit the serviceman to hold the necessary civil licences and fit him for a civilian occupation; the airline pilot might also benefit in time of war.

Mudeford, nr. Christchurch, Hants. R. L. Cox.

I WAS interested in your editorial suggestion (January 1st) that a training establishment for airline pilots be set up immediately.

I am an ex-R.A.F. National Service navigator and am now a university student, and a member of a university air squadron, undergoing pilot training (having managed to muster to pilot). Some weeks ago I wrote to B.O.A.C. to determine the prospects of a career as a pilot with them. The reply stated that before a pilot can be employed by B.O.A.C. the minimum qualifications required—as laid down by international regulations and by the Ministry of Civil Aviation—are the possession of a Commercial Pilot's Licence, Instrument Rating and Radio Telephony Licence.

These qualifications may be all very well from a legal aspect; but, from the practical point of view of a young man, to acquire these qualifications would mean an expenditure of upwards of £50 on examinations and flying tests alone, which is a substantial sum when one realizes that all or part of it may be forfeited on failure or partial failure of the examinations.

Therefore, whilst agreeing with you that there is a real need for a training establishment for airline pilots, I do think that in addition a scheme should be set up whereby young, suitable, would-be airline pilots be granted monetary aid (which could be repaid) to enable them to obtain the necessary licences, without which they cannot follow their calling.

University College, Hull. B. L. Sperring.

Instrument Presentation

I READ the article "Instrumentation by Reflection" (January 8th) with interest, for a great deal can be done to improve present methods of presentation.

My whole piloting and instructional experience cried out in horror, however, at the proposal to provide readings for a multiplicity of instruments (including such a vital one as altitude) by means of almost indistinguishable vertical scales.

This is entirely contrary to the present movement to ensure that controls and switches are of different shapes to avoid confusion and also flies in the face of automobile design, where the revolt of the public is causing manufacturers to give up the æsthetically attractive idea of providing the controls for all services in one long line of indistinguishable switches.

By all means let the readings be provided by reflection, but at all costs the presentation must avoid over-standardization, if safety is the main object. P. H. Baldwin,

Royal Air Force, St. Mawgan. Wing Commander.

History in Miniature

THE historical photographs published in your excellent "Fifty Years of Powered Flight" number, particularly of the Blériot XI, make me wonder whether your readers would be interested to see an illustration of an unusual model which we recently completed. Though resembling the cross-channel Blériot XI in many respects, it is, in fact, a replica of a machine (now in the Science Museum) which Mr. J. A. Prestwich designed and constructed in about 1909. The main departures from the Blériot are (1) the J.A.P. power unit, an eight-cylinder vee of about 50 h.p., believed to have been the first o.h.v. aeroplane engine; (2) tailplane set on top of fuselage; (3) rather smaller wing span (30ft). Weighing 570 lb unloaded, it was capable of around 50 m.p.h.

We learn from Mr. E. S. Prestwich that his father entered the monoplane for the *Daily Mail* £5,000 cross-Channel competition; it was to have been flown by a Mr. Harding, but two or three days before the attempt the shed in which it was housed collapsed, breaking the airscrew. Before repairs could be completed, Blériot won the coveted prize.

The machine was built in the garden of a house at the end of Northumberland Park, London. It was originally flown at Tottenham Marshes, until the local council objected on the score that it frightened horses grazing there.

No drawings were in existence from which the model could be made, but the Science Museum authorities kindly gave us facilities to take the necessary dimensions. The model is of 15in span, with the airframe structure built of brass and the wings covered with Japanese silk.

Constructing the engine to such a small scale (1in long) was a problem, but it is complete down to the exposed valve-stems and springs. Ian F. Walker,

London, W.3. Sales Manager, Westway Models, Ltd.

Vital Evidence

AIRLINE accidents, in certain circumstances, may leave no survivors and no direct (or even indirect) evidence as to the reason. A magnetic tape recorder for use in such emergencies, when there is not time to transmit details by radio, might enable the crew to indicate the causes, as the test pilot records his comments. The tape is virtually indestructible; it could be invaluable in determining the sequence of events, and the equipment is cheap and light enough to install in all airliners.

Cambridge. Morris J. Catherwood.

FORTHCOMING EVENTS

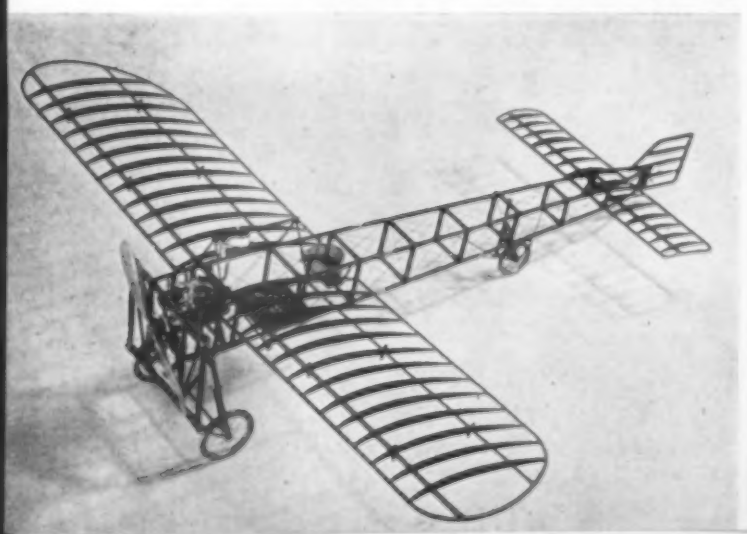
Jan. 22. Helicopter Association: Brains Trust.
Jan. 23. British Interplanetary Society (Provisional Western Branch): "Astronautics in the Next 25 Years," by E. Burgess, F.R.A.S.
Jan. 23. Aircraft Recognition Society: All-England Recognition Contest, Royal Institution, London.
Jan. 26. R.Ae.S. Section Lecture: "X-ray Metallography," by Dr. G. L. J. Bailey.
Jan. 25-29. Institute of the Aeronautical Sciences: 22nd Annual Meeting, New York. (Honors Night Dinner, Jan. 25.)
Jan. 27. R.Ae.C.: Dinner to 1953 Air Racing Champion and winner of King's Cup.
Feb. 2. R.Ae.S. Graduates' and Students' Section: "Structural Analysis of Swept-back Wings," by D. Howe, D.C.Ae., G.I.Mech.E., Grad. R.Ae.S. (jointly with I. Mech.E. Graduates).
Feb. 3. Royal United Service Institution: "Operational Applications for Water-based Aircraft," by G/C. G. W. Williamson, O.B.E., M.C., F.R.Ae.S.
Feb. 4. R.Ae.S. Section Lecture: "Air Intake Efficiency," by F. B. Greatrex, B.A., A.F.R.Ae.S.
Feb. 5. Photogrammetric Society: "New Plotting Machine for Air Photographs," by J. E. Odle.
Feb. 6. British Interplanetary Society: "Progress towards Astronautics," by K. W. Gatland.
Feb. 10. Radar Association: "Secondary Radar," by K. Harris.
Feb. 11. R.Ae.S. Main Lecture: "Recent Developments in the Structural Approach to Aeroelastic Problems," by Dr. D. Williams, M.I.Mech.E., F.R.Ae.S.

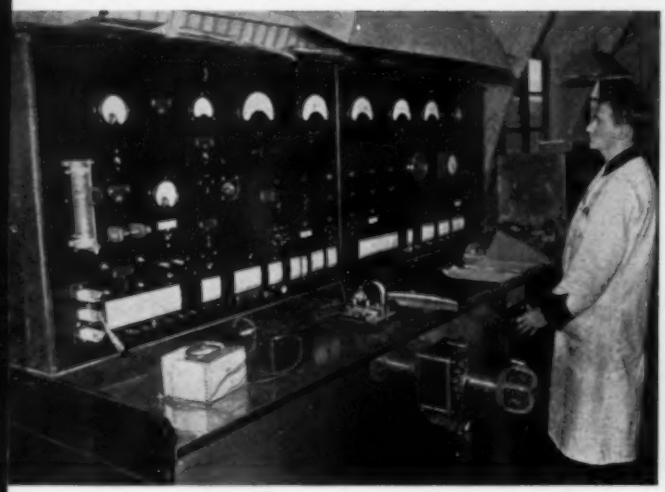
R.Ae.S. Branch Fixtures (to Feb. 12).—Jan. 25, *Halton*, Junior Members' Night. Jan 27, *Weybridge*, "Space Flight," by J. Humphries.

Feb. 1, *Derby*, "Aeronautical and Industrial Application of Small Gas Turbines," by F. R. Bell; *Halton*, films; Feb. 2, *Bristol*, "Operating Problems of the Transport Helicopter," by P. G. Masefield. Feb. 3, *Chester*, "Pioneer Flying," by H. Shaw (joint meeting with Stanlow branch of Inst. of Pet.); *Brough*, "Design, Construction and Flight-testing of the Universal Freighter," by C. W. Prower, W. A. Hargreaves and G. R. Parker. Feb. 4, *I.O.W.*, "Development of Propellers," by H. R. Leather and T. Brett. Feb. 6, *Birmingham*, annual dinner.

Feb. 8, *Halton*, "Flight Simulators," by G. H. Hellings. Feb. 9, *Belfast*, "Engineering Problems of Airline Operation," by B. S. Shenstone. Feb. 10, *Bristol*, joint meeting with Inst. Prod. Engineers (title to be announced); *Weybridge*, "Navigational Aids," by W/C. G. N. Mackintosh, O.B.E. Feb. 12, *Glasgow*, film show (including "Story of the Century").

THE PRESTWICH MONOPLANE MODEL, before wing-covering, described above by Mr. Ian Walker; he is seen (right) measuring the original.





"Flight" Photographs

Left) One of the three generator test-rigs; the generator (from a Dakota) is coupled to a drive on the front of the bench. A 10 h.p. variable-speed electric motor provides the power. (Right) Checking a T.K.S.de-icer pump; ten delivery pressures can be read simultaneously.

GROUND WORK for AIR SAFETY

Kearsley Airways' Service for Operators

ALTHOUGH Kearsley Airways, Ltd., sold their small fleet of Dakotas and stopped flying operations as long ago as March 1950, the company's name is still familiar to British independent airline operators. Unlike several other charter concerns which lost the struggle to remain airborne during the difficult early-post-war period, Kearsleys stayed in business—but not as an airline. Based at Stansted Airport, they are busily occupied with an increasing share of the work of overhauling aircraft components. Maintenance, repair and testing of such "controlled items" (i.e., those on which the airworthiness of an aircraft can depend) as magnetos, generators, pumps and undercarriages is an exacting task in which it pays to specialize.

Company records shown to us at Stansted recently (by Mr. L. A. Mears, chief engineer, and Mr. J. A. Plummer, supplies officer) illustrate the remarkable growth of Kearsley's activities since the first overhauled component—a magneto for B.E.A.—was turned out in December 1950. The number of items handled in the ensuing 12 months was 1,171; the 1951-52 total was 3,200; and for 1952-53 the output of 4,869 components exceeded that of the two preceding years combined.

A summary of equipment seen during a tour of the shops emphasizes the diversity of rigs required for testing to A.R.B. standards a comparatively small range of innocuous-sounding components. Most of the rigs were specially constructed by Kearsleys, though one exception is the American-built Gisholt balancing machine, used for checking armatures, which can show an out-of-balance throw of 0.00005in. Magneto functioning is observed on a special endurance rig with a Perspex case housing the magneto itself; a vacuum pump extracts air from the casing to simulate all altitude conditions up to a maximum of 38,000ft. Magnetos from Rapides, which do not require the altitude check, are run from a converted Gipsy Queen wheelcase. The electrical section contains three rigs for endurance-testing and performance-measurement of generators, and Magnaflux equipment for detecting cracks in ferrous components. Starter motors are also dealt with in this section.

Hydraulics occupy a second section, in which components handled range from oleo legs and oil coolers to feathering pumps and cockpit gauges. Wheels and brake assemblies are also overhauled. The rig illustrated is for checking T.K.S. de-icing gear, as fitted to Vikings and Yorks.

Work undertaken by the company is primarily for independent companies, including Airwork, B.K.S., Eagle and Skyways. Whereas the Corporations' large fleets imply overhaul at their own bases, an independent operator with a fleet of, say, six Dakotas is unlikely to set up a £500 rig for checking a handful of oleo legs at infrequent intervals. This often holds good even with larger companies which perform their own C. of A. overhauls, and can also apply to flying clubs. Kearsley Airways do in fact handle a fair number of magnetos and starters for light aircraft, although 90 per cent of their work is on components for Dakotas, Vikings and Yorks.

AVRO CANADA APPOINTMENT

THE appointment is announced of Mr. Charles A. Grinyer as chief engineer of the Gas Turbine Division of A. V. Roe Canada, Ltd. He was formerly chief development engineer and, before that, assistant chief development engineer. Mr. Grinyer's experience in the gas-turbine field dates back to the early days of development. He joined Avro Canada in April, 1952, from the Bristol Aeroplane Co., where he was chief technical assistant to the general manager, advising on gas-turbine manufacture. Previously he had spent ten years in British Government service and in 1946 had been responsible for co-ordinating jet-engine test procedures. At Avro Canada he has played an important part in the development of the Orenda, which powers the CF-100.

Mr. C. A. Grinyer.

"BOB" HALL LEAVES FAIREYS

IT is learned that Mr. Robert A. Hall has left the Fairey Aviation Co., Ltd., where he was technical adviser (civil), to become an independent engineering consultant to the automobile, aviation and associated industries. "Bob" Hall learned to fly at Brooklands in 1931. After working for Vickers-Armstrongs and Saunders-Roe, he was appointed chief engineer of British Airways, and subsequently research engineer of B.O.A.C. During the war he was largely responsible for "anglicizing" American aircraft delivered to the R.A.F.; later he was seconded to Fairey's. One of his principal current interests is the engineering application of Fibreglass in car construction. Mr. Hall will have an office at Grand Buildings, Trafalgar Square, London, W.C.2.

Mr. R. A. Hall.

One of the two Pest Control Hiller 360s about to pass overhead while spraying rubber trees in Ceylon. Note the density of the liquid sulphur compound cascading from the spray-bars.

. . . AND NOW RUBBER SPRAYING

Pest Control Ltd., Cover New Ground in Ceylon Experiment

AN experiment in the spraying of rubber trees, using both helicopters and fixed-wing aircraft, has been inaugurated by Pest Control, Ltd., in Ceylon. Two Hiller 360s and one Auster have begun a test programme over a series of rubber plantations under the auspices of the Rubber Research Institute, and in conjunction with the Planters' Association of Ceylon.

As mentioned in a news item in *Flight* of January 8th, the operation is aimed at the suppression of *oidium heveae*, a rubber-leaf mildew which affects young foliage and causes the leaves to fall prematurely. Several such defoliations in a year may reduce by 40 per cent the amount of latex collected from each tree. The mildew has up till now been attacked by sulphur dusting, hand-manipulated motor dusters being employed: light machines of this type have had to be used because of the difficult terrain. It has meant, however, that the dusters were unable to reach the highest branches of the trees, which average 60ft and occasionally reach 100ft.

It was at first thought that aerial spraying would be impracticable because of the hilly nature of the country, because of the difficulty of distributing the powders, and because of the precise timing required in spraying rubber trees. However, Dr. Young, of the Rubber Research Institute of Ceylon, developed a liquid sulphur spray which gave promising results. Dr. W. E. Ripper, managing director of Pest Control, Ltd., visited Ceylon early last year to investigate the possibilities of using helicopters. He decided that it was feasible and, in October 1953, Mr. J. Harper (aviation manager) went to Ceylon to prepare for the operation.

Although different groups of trees have to be sprayed at different times, in accordance with their state of leafage, it was found that each group (or "clone," as it is called) covered an area roughly equal to that of the average field in England. With the aid of markers—flags on bamboo sticks lashed to the tree-tops—it is therefore possible to achieve correct timing and spray distribution. Positions of the marker-flags are indicated on the pilots' maps.

Altogether, 2,500 acres of planations owned by eighteen estates are being treated, each area receiving five applications; two different sulphur preparations are used. Although the experiment was originally a private venture, arranged between Pest Control, Ltd., and the estates, the Ceylon Government subsequently made a grant of Rs. 100,000 (£7,500) towards the cost.

The two Hillers and the Auster, with their refuelling equipment, were despatched to Ceylon and assembled there. Operations began on January 11th, and have so far proved practicable. Mr. H. E. Johnson (ex-Fleet Air Arm) is flying the Auster, and Mr. R. Hill and Mr. G. Toye (both ex-R.A.F.) are flying the Hillers. Mr. C. J. Edwards, one of Pest Control's senior biologists, has been seconded to the Rubber Research Institute of Ceylon for the period of the experiment to assist in assessing the results in relation to the previous sulphur-dusting technique.

Pest Control emphasize that the operation is essentially an exploratory one to determine the practicability and effectiveness of the method; the areas being sprayed are small in relation to the total acreage of rubber plantations to which similar treatment could be extended if the experiment succeeded. Success will be indicated by stronger, healthier appearance of the trees and an increased yield of latex, and should become apparent within six months.

So irregular and so densely wooded is the country that the finding of suitable landing-grounds near the operational areas has

Quick turn-round: with the rotor still turning, the pilot waits for the tanks to be filled with sulphur spray before taking off for another run. At the controls, in the close-up view, is Mr. Richard Hill, who is pilot in charge.

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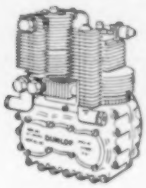
THE MARK I **COMPRESSOR**  *a 3,000 p.s.i. supercharged unit maintaining ground level performance up to 30,000 ft.*

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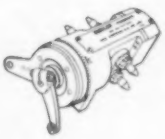
The **INFINITELY VARIABLE**  *follow up control for multi-position flap operation,* **PRESSURE RELIEF VALVES** *with a wide selection of blow-off pressures and supplementary units such as* **FUEL PRESSURISATION VALVES** *which deliver a high rate of flow at low output pressure.*

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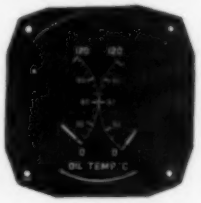

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Movement Controlled -by the VIG/1AR

The David Brown VIG/1AR Tractor towing R.M.A. DISCOVERY, the Flagship of the B.E.A. Viscount (Discovery Class) Fleet at the 1952 S.B.A.C. Show.

By courtesy of "The Aeroplane"

A DRAWBAR PULL OF 3800 LB. enables the David Brown VIG/1AR to handle aircraft up to the Viscount, Convair, Viking, and Dakota class with ease and safety. The 4-speed gearbox with its low ratio 1st gear equips the driver for full-power 'break-out' with easy under-way gear-shift to suitable working speed. The David Brown VIG/1AR speeds up ground movement, lowers fuel costs, and although primarily designed for aircraft handling it can turn its hand to every conceivable haulage job around the airfield.

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DAVID BROWN
INDUSTRIAL TRACTORS

THE DAVID BROWN CORPORATION (SALES) LIMITED, TRACTOR DIVISION, MELTHAM, HUDDERSFIELD

. . . AND NOW RUBBER SPRAYING

proved a difficult problem, particularly in the case of the fixed-wing aircraft. In some places it is necessary to reduce insecticide-loads in order to obtain the necessary range for reaching, and returning from, the operational areas.

Flying starts at dawn and is continued intensively until 11 a.m. by which time the sun's heat renders the air too turbulent for flying at the necessary low altitudes.

Foreign contracts, such as the one described above, form the principal activity of Pest Control during England's winter season. Apart from private operations, however, the company is engaged on several development contracts, namely with Desert Locust Control and with the Bristol Aeroplane Co., Ltd., new locust-spraying gear, and spraying equipment for the Bristol Sycamore helicopter, being in process of preparation.

As is now well known, Pest Control have already undertaken spraying operations in the Sudan, Kenya, Central and Southern Africa, Switzerland and France. The Swiss contracts—which, as related in an article in *Flight* of August 14th, 1953, were directed against the maybug, a crop-ravaging beetle—incidentally provided some useful flying data for the Ceylon operation, since the nature of the terrain is comparable.

By a coincidence, the present work is being undertaken almost exactly ten years since Pest Control, Ltd., filed the world's first patent for helicopter spray equipment. They had based their designs on performance and structural data, obtained from America for prototype Sikorsky helicopters and on aerodynamic data for the Cierva Autogiro. The first trials were made on a Sikorsky R-4 helicopter loaned by the R.A.F.

B.G.A. AWARDS FOR 1953

THE British Gliding Association has announced its list of awards for 1953. The de Havilland Cup for the best altitude performance is jointly awarded to F/L. A. D. Piggott and F/Sgt. Brian Whatley of the A.T.C., who took a Sedbergh to an altitude of some 17,000ft above sea level (height gained, 15,240ft) during the National Gliding Contests; they also receive the Seager Cup for the best two-seater performance of the year.

Geoffrey Stephenson (Sky), the British Championship winner, gains the Manio Cup for the best goal flight, in recognition of his 192-mile journey from Great Hucklow to Lympne, while the Volk Cup for the best out-and-home flight goes to Philip Wills, who took a Sky 100 miles from Great Hucklow to Rearsby and back.

J. S. Armstrong (Olympia) gains the Wakefield Trophy for the longest flight—197 miles, from Great Hucklow to Hastings. The Douglas Trophy, awarded to the club showing three flights aggregating the greatest cross-country mileage, goes to the London G.C., three of whose members (Stephenson, Ellis and Lee) made flights totalling 456 miles.

HIGH DJINNKS

PILOTED by M. Jean Dabos, one of the three Djinn helicopters built to date by S.N.C.A.S.O. is claimed to have set up a world altitude record, for helicopters weighing less than 500 kg, of 4,789 m. (15,700ft approx.). Although the flight was made last December, the news has only just been released. The Aero Club of France has asked for confirmation by the Fédération Aéronautique Internationale.

The two-blade rotor of the Djinn is driven by compressed air supplied by a Turboméca Palouste; there are no combustion chambers at the tips and the machine is considerably quieter in operation than other helicopters. The rudder operates in the exhaust efflux from the Palouste. Fuel consumption is said to be less than one-third of that of an equivalent ramjet helicopter and, as the air jets are set in the edges of the blades, autorotation qualities are said to be in every way comparable to those of a helicopter with mechanical transmission and the same disc loading. A two-seat production version is planned and this should have a duration of about three-quarters of an hour.

REFRESHER for VETERANS

THE nucleus of the new German operating company, Luftag, comprising four German pilots who were employed until the war by Lufthansa, and whose arrival in this country we reported last week, has now started a refresher course with Air Service Training, Ltd., at Hamble.

The first action has been to check out the pilots for solo flying on Chipmunks. The intention is to renew commercial licences; and the course of retraining in flying, and in modern aviation law, procedures and practices—including use of the English language which has been adopted for international flying control—is expected to take about three months. After this the team will proceed to San Diego for the start of conversion to the American airline types which they are to fly when operations of the German company begin, initially with European services, this summer.

Between them, the four German pilots, all in their forties, have some 40,000 hours' flying experience on old types of aircraft. They will no doubt find Super Constellations and Convair 340s very different from Ju 52s. None of them flew operationally against this country, and by far the greater part of their time has been logged in transport aircraft. Accompanying the four pilots are three German instructors (specializing respectively in meteorology, aircraft engineering and traffic control) who are studying modern training methods as exemplified at A.S.T.

The training contract, which includes courses for three ground engineers as well as the pilots, is worth between £4,000 and £5,000 to Air Service Training. The bill is being paid by Luftag.

In an A.S.T. Chipmunk, with W/C. H. A. Stratton (chief flying instructor) in the rear seat, H. Topp receives his check-out for solo flying. The navigation-school group shows (left to right) W. Blume, H. Topp, navigation instructor A. J. Plowman, J. Rathje and R. Mayr.

CIVIL AVIATION

ELBA ACCIDENT DEVELOPMENTS

THE circumstances of the accident in which B.O.A.C. Comet G-ALYP was lost off the island of Elba on January 10th have caused widespread speculation. As we recorded last week, all Comets in service with the Corporation were immediately recalled to London for "minute and unhurried" inspection. Comets operated by Air France and U.A.T. were also grounded for inspection, but the R.C.A.F., which operates two Series 1As, announced that they saw no reason to follow suit.

Three B.O.A.C. Comets were abroad when the inspections were begun. Two returned home from Singapore and Johannesburg on January 13th and the third arrived from Tokyo on January 15th, their passengers having been transferred to other aircraft. The inspection, which involved the complete stripping of two of the aircraft, had, up till the time of going to press, provided no indication of any fault or weakness. Last Monday, B.O.A.C. resumed normal crew-training and familiarization flights with Comets, but no passengers were to be carried until the technical examination was completed.

Four lines of investigation are being pursued: examination of the remaining Comets, the attempted recovery, by the Royal Navy, of G-ALYP's wreckage from the sea, medical examination of the 15 bodies recovered, and the investigation of the possibility of sabotage. Admiral Lord Mountbatten is co-ordinating the search for the wreckage, which is believed to be lying at a depth of 450ft or more in the position 10° 16′ 55″ E, 42° 31′ 31″ N. Since this is outside Italian territorial waters, investigation has now become a British responsibility. Mr. Lennox-Boyd, Minister of Transport and Civil Aviation (who announced that a public inquiry would be held in Britain), flew to Italy on January 17th to supervise the proceedings. Four Naval vessels were ordered to proceed to the scene of the accident to salvage the wreckage; the frigate *Wrangler*, the dan-layer (marker-buoy vessel) *Sursay*, the salvage ship *Sea Salvor*, and the boom defence vessel *Barhill*. An underwater television camera was flown out to Rome from England, as well as deep-diving gear.

Professor Folco Domenici, head of the Institute of Forensic Medicine at Pisa, carried out provisional autopsies on the 15 bodies. On January 16th, Sir Harold Whittingham, B.O.A.C.'s Director of Medical Services, and G/C. W. K. Stewart, of the R.A.F. Medical Establishment at Farnborough, flew to Italy to continue the examination.

Despite a series of rumours, investigations had so far provided no concrete evidence. Evidence of explosion reported to have been found on the bodies was not generally confirmed, and the similarity between the Comet and Philippine Airlines DC-6 accidents was rapidly dissolving as definite statements were published. For instance, it was learned from Beirut on January 16th that the Lebanon Directorate of Civil Aviation had stated that the Comet reached Beirut at 0500 hr, local time, on January 10th. It left the airport at 0720—2 hr 20 min later. The accident occurred 8 hr after touch-down at Beirut and 5 hr 35 min after take-off. The length of the stay at Beirut was due to fuel pump repairs, which were effected by the company's engineers, who did not leave the aircraft throughout its stay at Beirut. Cargo put on board there included a parcel for Rome, weighing 10.5 kg, a parcel for London, weighing 32 kg, and a parcel of powdered phosphate samples, weighing 2 kg. The Philippine Airlines DC-6 reached Beirut on January 14th at 0627 hr, local time, and took off at 0747 hr, this being the time required for refuelling, which was carried out under the joint supervision of the aircraft crew, the company's staff and Beirut airport officials. The subsequent accident took place 7 hr and 18 min after landing at Beirut, and 5 hr 58 min after take-off. The DC-6 took on no cargo.

After the weekend, the possibility of sabotage was still officially "not excluded," but neither was there definite reason to suspect it. It has been noted that in both last year's Comet accident at Calcutta and in the most recent accident the large centre-section fuel tank of the aircraft was empty, and that kerosine vapour will in certain critical conditions form a potentially explosive mixture. It does, on the other hand, appear mostly unlikely that structural or other failure in the engines was to blame. Hydraulic fluid as a possible source of danger has been discussed, but this again has no definite evidence in support.

Every effort was being made to salvage the wreckage, although this was known to be an extremely difficult task owing to the sea conditions and the depth and nature of the sea bed. But until this is achieved it appears unlikely that the cause of the accident can be established with any certainty.

Last Monday B.O.A.C. stated that hours flown in commercial service by their own Comets totalled 25,000; of this number, 3,500 hours had (as reported last week) been accumulated by G-ALYP. The first Comet, its flying completed, is meanwhile undergoing routine structural tests at R.A.E., Farnborough.

NO SUCCESSOR FOR DR. PLESMAN

AN indication of the great authority vested in the late Dr. Albert Plesman as president of K.L.M. is the announcement that the company's directors, after consultation with the board of control, have decided not to appoint a successor for the time being. Their official statement added that: "In accordance with the articles of association, the management of the company therefore remains in the hands of the executive vice-presidents, Messrs. F. von Balluseck, F. Besancon and M. J. van der Ploeg. Dr. L. H. Slotemaker, executive vice-president foreign relations, remains in charge of the executive duties in connection with foreign relations."

INDIAN ORDERS

SIX Beechcraft twins seating seven or eight passengers have been ordered for the feeder routes of Indian Airlines Corporation. An equal number of Viscounts or Convair 340s will also be ordered shortly. A report from Bombay says that the final choice was to have been at a meeting of Corporation executives "late this month."

VISCOUNT'S LONDON-PARIS RECORD

ON January 10th a Viscount of Air France flew from London Airport to Orly in the exceptionally short time of 44 minutes. The great-circle distance between the two airports is 227 miles, so that the average speed works out at 309 m.p.h. This is the first recorded occasion on which a passenger-carrying airliner has flown between the two capitals at over 300 m.p.h. Traffic procedures normally make it impossible for a pilot to take the shortest route, so the Viscount's cruising speed must have been considerably higher than the figure quoted.

Apart from record flights by jet fighters, the fastest journey between London and Paris was made on July 25th, 1948, by the experimental Nene-Viking, which flew 222 miles from L.A.P. to Villacoublay in 34 min—equivalent to over 390 m.p.h.

PHILIPPINE DC-6 LOST

ONE of the three DC-6s operated by Philippine Airlines crashed while approaching Ciampino Airport, Rome, on January 14th. It was totally destroyed and the crew of nine and seven passengers lost their lives. The aircraft, registered PI-C294, which was on a scheduled flight from Manila to London, had taken off from Beirut and was due to make its last refuelling stop at Ciampino when the accident occurred. Eye-witness accounts are contradictory, but it appears that the aircraft dived from a height of 6,500ft and narrowly missed some buildings before crashing in a field close to the airfield. Some reports stated that two engines were on fire, but it is not certain whether the aircraft blew up just before or immediately after contact with the ground.

ON THE DOTTED LINE: Directors of Fred Olsen Airtransport, the Norwegian independent company, signed a contract for two Viscount 700s on January 14th. Firm orders for the Viscount thus cover a total of 88 aircraft—47 for overseas operators. Pictured as the contract was signed are Mr. T. E. R. Hill (standing), manager of Vickers-Armstrongs' contracts department; Mr. E. J. Waddington, Vickers-Armstrongs director; Mr. P. Hegnar and Mr. R. Rynning, directors of Fred Olsen.

TOM E. BRANIFF, whose death is reported below, founded Braniff International Airways 30 years ago. The company—one of whose Convair 340s is seen, right—has an exceptional safety record.

T. E. BRANIFF

ONE of the twelve people killed when a privately owned amphibian crashed as a result of wing icing at Shreveport on January 10th was Mr. Tom. E. Braniff, president of Braniff International Airways, Inc. This company, now the seventh largest operator in the United States, has one of the finest safety records in the world, a fact which makes the circumstances of its founder's death particularly tragic.

Nearly all the twelve who lost their lives were senior business executives, and the accident may result in one of the largest liability losses to be sustained by insurance interests—much, no doubt, by the London market. It is customary with what are known as "industrial-aid aircraft" for each seat to carry automatically a minimum of perhaps 50,000 dollars personal accident cover; in this case the passengers themselves also had very considerable private insurances.

Mr. Braniff was one of five people who bought a five-seater Stinson for recreational purposes in 1927. It was a partnership which gave birth to an airline. The following year the Stinson was being operated on daily passenger services between Tulsa and Oklahoma City, with Tom Braniff's brother Paul acting as both pilot and general manager of the airline.

Braniff Airways proper was founded in 1930 with a fleet of two Lockheed Vegas. Five years later the company bought out Long and Harman Air Service, bringing the route mileage to over 3,000. Another, more important merger took place in 1952, when Braniff were combined with Mid-Continent Airlines. The total route mileage is now nearly 19,000, with services radiating from Dallas, Texas, over a complex network to Minot and Minneapolis in the north and with Miami, Panama, Rio and Buenos Aires among the southern destinations.

The company has not had a single fatal accident in the past 15 years and has received a dozen consecutive awards from the National Safety Council. Passengers are being carried at an annual rate of over one million by the fleet, which includes nine DC-6s, eight DC-4s, 26 Convair 340s and 32 DC-3s.

B.E.A. STEWARDESSES look forward to the installation (forecast in "Flight" last week) of Murphy public-address equipment on Viscounts and Elizabethans, a step which will greatly simplify the "briefing" aspect of their service to passengers. The four shown practising microphone technique with the aid of a tape recorder at B.E.A.'s Radio Training Unit, Northolt, are (left to right) Carol Herdman, Pat Hill, Beatrice Toal and Anne Whiteway.

BREVITIES

MOSCOW RADIO has reported that a regular helicopter mail service was opened on January 12th between Moscow and towns in the Verieysk, Luga and Uvariv districts (which lie north and north-west of the capital). No mention was made of the type of helicopter employed.

* * *

Sir Clement Wakefield Jones, a part-time member of the Board of B.O.A.C., will retire when his term of office expires at the end of the Corporation's financial year (on March 31st, 1954). Lord Rennell has accepted an invitation to join the Board when Sir Clement retires.

* * *

Aided by strong tail-winds, Super Constellations set up two unofficial Atlantic records last week. An L.1049C of Air France flew 3,625 miles non-stop from New York to Paris in 9 hr 55 min (365 m.p.h.); and a similar machine, operated by K.L.M., flew the New York-Amsterdam route non-stop in 10 hr 14 min—3,630 miles at over 350 m.p.h.

* * *

On February 1st the M.T.C.A. will introduce certificates of competency for aerodrome controllers, to be valid only at the specific airfields at which tests have been conducted. The syllabus for the examination, and other details of the certificate, are outlined in a pamphlet which can be obtained from the Secretary, Ministry of Transport and Civil Aviation (ATL 1b), Berkeley Square House, London, W.1.

* * *

In seeking British and American Government approval to extend their normal London-Montreal services to Chicago, B.O.A.C. are following a lead set by two other major airlines. Last year Air France became the first transatlantic operator with a service terminating at Chicago and on May 1st PanAm will open a DC-6B service between London, Detroit and Chicago.

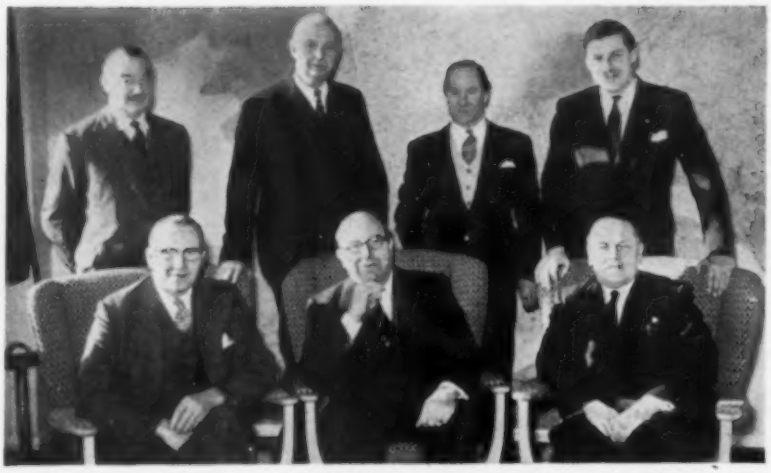
* * *

Since 1947 Seaboard and Western Airlines have been seeking C.A.B. approval to operate a regular all-freight service across the North Atlantic. A report from Washington last week suggested that their efforts were at last proving successful: a C.A.B. examiner has recommended that the airline receive a five-year licence to operate an all-freight service linking New York, Philadelphia and Boston with most countries in Western Europe. The recommendation has yet to be finally approved by the full C.A.B., and by President Eisenhower.

CLUB AND GLIDING NEWS

THE newly formed Orkney Flying Club has just acquired its first aircraft—a Tiger Moth, which was delivered to Kirkwall airport on January 11th by Mr. F. H. Davey, a former Coastal Command pilot. On arrival from Wolverhampton (weather was bad and he flew *via* Blackpool, Carlisle, Turnhouse, and Dalcross) Mr. Davey was met by Mr. E. Gamble and Mr. B. Wood, respectively chairman and secretary of the club, and also the club captain, Mr. R. Learmonth.

DELEGATES from the 37 member groups of the Royal Canadian Flying Club's Association will attend the Silver Jubilee annual meeting held in Ottawa from January 23rd to 27th. The Association is celebrating 25 years of continuous flying training and much useful service to Canadian aviation, including the operation by clubs of 22 elementary flying training schools during the second world war and, more recently, training of reserve officers and air cadets for the R.C.A.F. The Governor-General of Canada, the Rt. Hon. Vincent Massey (patron of the Association) is to be present at a dinner on January 26th, at which the guest speaker will be Sir William Hildred, director-general of I.A.T.A.



WEST RIDING CLUB: As reported in "Flight" last week, the re-opening of Yeadon Airfield, Leeds, and the formation of Yeadon Aero Club, took place simultaneously on January 10th. Directors of the new club are, left to right: (back row) Messrs. R. E. Townend, A. Shaw, R. Lister and G. G. Rennard: (front row) Messrs. S. O. Whitely, L. S. Dawson and W. Hudson.

A LINK TRAINER recently bought by Fair Oaks Aero Club has been overhauled and installed, and by now should be ready for service. To those members interested in basic instrument flying and night flying, the Link will offer valuable assistance. For example, to obtain a night rating on a P.P.L., a pilot must have at least five hours' instruction in instrument flying: half of this time, however, may be spent in the Link. Instruction costs £1 per hour.

ENTRIES for the international gliding contests at Great Hucklow in July and August are to be limited to 40, probably made up of 25 single-seaters and 15 in the two-seat class. No country will be able to enter more than three pilots; the British team is to consist of Philip Wills, Geoffrey Stephenson and Lorne Welch, with Frank Foster and "Nick" Goodhart as reserves. As reported in our issue of January 1st, one or both of two new two-seater machines (the Slingsby T.42 and the K.1 from Elliotts) may be included in the British entry.

ON October 31st last year Auster Autocar VH-ADY, piloted by Miss Margaret Cornwell with Miss M. Sincotts as navigator, flew from Sydney to Adelaide non-stop. The average speed of 90 m.p.h. was creditable, in view of the very bad weather encountered all the way along the 720-mile route, but in no way remarkable. There was, however, one outstanding feature of the flight: it was officially observed by the Aero Club Federation of Australia and it was subsequently recognized as the first light aircraft record ever set up in the Commonwealth.

Two weeks later, flying the same Autocar, but with Mr. G. E. Wills as radio operator/navigator, Miss Cornwell set up another record by covering the 930-mile Sydney-Brisbane-Sydney route non-stop at 112.7 m.p.h.; and on December 12th this team made a 116 m.p.h. record flight on the 1,160-mile Sydney-Broken Hill-Sydney route.

These three flights comprised the first part of an enterprising programme of record attempts sponsored by Kingsford Smith Aviation Service Pty., Ltd., to "wake up the general public of Australia to the advantages of the use of light aeroplanes, whether they be for private, business, or agricultural purposes." The company's managing director, Mr. J. T. Brown, has told us the story behind the attempts in a recent letter from Sydney. He says that the remaining flights, which have been postponed until March or April when the monsoonal rains have ceased, will be as follows: Sydney to all the capital cities with the exception of Perth; Sydney-Melbourne-Sydney; and round Australia.

Mr. Brown explains the choice of aircraft engine and pilot with commendable frankness. Kingsford Smith Aviation Services are the sole agents for the "Super Autocar" J/5G and its 140 h.p. Cirrus Major Series 3. To obtain the maximum publicity a woman pilot was chosen—32-year old Miss "Meg" Cornwell, secretary to Mr. Brown and a "good steady, reliable pilot" of four years' experience.

The requisite 1,500-mile range at 110 m.p.h. was obtained by removing the rear double-bench passenger seat and installing a light-alloy tank holding 49 gallons, giving a total petrol capacity of 81 gallons. As a precaution an extra two-gallon oil tank was fitted. The Autocar was equipped with a Plessey six-channel V.H.F. set, which proved reliable. The crew were provided with special pneumatic cushions, which afforded comfort even on the longest flight of 10 hours, and refreshment in the form of malted milk tablets, shelled almonds and raisins, emergency rations of the same type and two large vacuum-flasks of water. Average fuel consumption on the three flights was about 6½ gal/hr and the Cirrus Major used only one pint of oil hourly.

MORE news of feminine record-breaking comes from France, where on January 12th, a women's endurance record for two-seat gliders was gained (subject to confirmation) by Jacqueline Mathe and Marinette Garbarino, flying a Fouga CM7. The existing *record féminin* in this category is shared by Mme. Choisnet-Gohard and Mlle. Y. Mazellier, who flew for 28 hr 41 min—also in a CM7—in November 1951. The margin by which the latest contenders exceeded this figure is not yet known.

AUSTRALIA'S FIRST official light-aircraft records have lately been established by Miss Margaret Cornwell, flying this Cirrus-powered Auster Autocar The story behind her flights, intended to stimulate Australian interest in light aircraft, is told above.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News

OVER A GREEN SEA: Three of the Sikorsky S-55 helicopters operated by No. 848 Squadron, R.N., troop-carrying over the Malayan jungle. (See "Helicopter Squadron Wins Boyd Trophy".)

R.A.F. Swifts

NOW undergoing final flying tests at Vickers-Armstrongs Supermarine factory at South Marston, Swindon, the first Swifts for Fighter Command are expected to be delivered shortly. The exact date depends upon the effect of weather on the progress of the tests.

Helicopter Sqdn. Wins Boyd Trophy

THE most important trophy of the Fleet Air Arm—the Boyd Trophy—has been awarded to No. 848 Squadron, R.N., for services with their Westland Sikorsky S-55 helicopters in Malaya. Until a fortnight ago Lt-Cdr. S. H. Suthers, D.S.C., R.N., was in command but Lt-Cdr. B. Paterson, R.N., has now taken over.

No. 848 Squadron formed at R.N. Air Station Gosport at the end of 1952 and within a few weeks sailed for the Far East in the ferry carrier H.M.S. *Perseus*. Officers and men had little opportunity of training before leaving, and even their flying experience in the S-55 was severely restricted.

The squadron became operational in Malaya on January 24th, 1953, and since then over 10,000 troops have been airlifted and more than 220 casualties evacuated from jungle clearings. Nearly 200,000 lb of freight has been transported and tracker dogs lowered to search for bandits. Flying hours total more than 3,500.

The latest figures available—for the first ten months of 1953—show an aircraft serviceability of 79.6 per cent and it is a proud boast of the ground crews that the squadron has never had to cancel an operation because of lack of aircraft. Not a single S-55 has been lost as a result of operations.

R.N.Z.A.F. Auxiliary Affiliations

WITH the intention of fostering a closer inter-relationship, the four territorial squadrons of the Royal New Zealand Air Force have become affiliated with four of the Royal Auxiliary Air Force at home. The units concerned are: No. 1 (Auckland) Squadron with No. 600 (City of London) Squadron, No. 2 (Wellington) Squadron with No. 601 (County of London) Squadron, No. 3 (Canterbury) Squadron with No. 610 (County of Chester) Squadron and No. 4 (Otago) Squadron with No. 603 (City of Edinburgh) Squadron.

Made during the Queen's tour of New Zealand, this announcement is singularly appropriate, for Her Majesty is Honorary Air Commodore of the Edinburgh unit and the Duke of Edinburgh is Honorary Air Commodore of No. 601 Squadron.

The New Zealand territorial squadrons were formed in 1931 and at the outbreak of hostilities were mobilized for general reconnaissance duties at home. Later they were absorbed into the regular service and served in the South Pacific theatre.

It is hoped that the affiliations will bring about a regular exchange of information about training and social activities and the extension of hospitality to members visiting one anothers' countries.

FONTAINEBLEAU BOARD: A conference of commanders of Allied Air Forces Central Europe in session. Left to right: Major-General R. M. Lee, U.S.A.F., C-in-C. 4th A.T.A.F.: Air Marshal J. L. Plant, R.C.A.F., Chief of Staff: Air Chief Marshal Sir Basil Embry, R.A.F., C-in-C. AAFCE: Major-General D. D. Hall, U.S.A.F., Assistant Chief of Staff for Operations, AAFCE: Air Marshal Sir Harry Broadhurst, R.A.F., C-in-C. 2nd A.T.A.F.

R.Aux.A.F. Appointment

THE Air Ministry announces the appointment of S/L. C. Wright, A.F.C., to Command No. 3701 (County of Sussex) Radar Reporting Unit, which is located at "Leahurst," London Road, Withdean, Brighton, Sussex.

S/L. Wright, a Regular R.A.F. officer, was first commissioned in 1940 and posted to the Special Duty Flight at Christchurch for flying duties and later served with the Telecommunications Flying Unit. He served also with No. 267 and No. 233 Squadrons and became a prisoner of war while serving with the latter.

After repatriation in 1945 he took up flying duties with No. 271 Squadron and later became a flight commander at No. 1382 Transport Conversion Unit. His next post entailed five months' flying duty as a test pilot with No. 390 Maintenance Unit and, at the conclusion of this appointment, he went to Air H.Q. Ceylon.

W/C. D. M. Egan

WE regret to announce the death of W/C. D. M. Egan, A.F.C., which occurred on January 13th, after a short illness. He was 45. Below is an appreciation written by a fellow officer at Coastal Command H.Q.:—

"Paddy Egan enjoyed a wide circle of friends in all branches of aviation.

"Throughout his 30 years in the Service, during which he was successively aircraft apprentice, tradesman, N.C.O. pilot, C.F.S. instructor and staff officer, he consistently gave of his considerable best, for the good of the Royal Air Force.

SERVICE AVIATION . . .

"Whilst night flying in 1941, his training aircraft was attacked by an enemy intruder, he was badly wounded, his pupil was killed and his aircraft was in flames. He landed it safely and was awarded the King's Commendation for brave conduct. Later in the year he was awarded the Air Force Cross.

"His sense of duty, his whole-hearted loyalty and his happy personality will be sadly missed by the Service, and by those who had the good fortune to be his friends.—B.E.C."

Australian Director's Visit

DIRECTOR of Studies at the R.A.A.F. College at Point Cook, Victoria, Mr. A. J. Black is making a tour of Service and other educational institutions, research establishments and aircraft factories in Britain.

The R.A.A.F. College is the Australian counterpart of Cranwell, which is to be one of the units visited by Mr. Black. Others will include H.Q. Technical Training Command, R.A.F. Technical College, Henlow, No. 1 School of Technical Training, Halton, and No. 209 Advanced Flying School at Weston Zoyland, Somerset.

Oil Dock Fly-past

AT the opening of the new oil dock at Eastham, near the entrance to the Manchester Ship Canal, on Tuesday last, the programme was to include a fly-past by twelve Meteors drawn from the two local R.Aux.A.F. squadrons—No. 610 (County of Chester) and No. 611 (West Lancashire). Flying arrangements were under the overall command of W/C. M. Kellett, D.F.C., who is the Commanding Officer of Hooton Park.

No. 611 is commanded by S/L. S. Kirtley and No. 610, the present holders of the Esher Trophy, by S/L. J. E. Storrar, D.F.C.

R.A.F. Appointments

AS from Monday next, January 25th, A. Cdre. G. L. Worthington, C.B.E., is appointed A.O.C. No. 42 Group, Maintenance Command. He will be succeeded as Director of Equipment (D) by Act. A. Cdre. R. C. Storrar, O.B.E.

A. Cdre. Worthington was commissioned in 1923 from the R.A.F. College, where he won the Sword of Honour. Since 1926 he has specialized in equipment work and before his Air Ministry appointment in 1948 as D. of E. (B) was Senior Equipment Staff Officer at H.Q. Air Command South-east Asia.

A number of appointments in the rank of group captain and wing commander have also been announced recently by the Air Ministry. For administrative staff duties G/C. H. D. Connor has gone to No. 40 Group, G/C. W. S. Calder to No. 22 Group, W/C. J. R. Valentine, D.F.C., to No. 23 Group, W/C. H. E. Kelsey to 2nd T.A.F., W/C. E. F. Hales to No. 42 Group, W/C. W. Corden, O.B.E., to R.A.F. Technical College, W/C. H. T. Morgan to M.E.A.F., W/C. C. W. Crimmin, M.B.E., to No. 4 School of Technical Training, W/C. G. A. C. Potts, D.F.C., to Wildenrath, W/C. T. E. Horsfield to Cosford and W/C. S. P. Austin to Technical Training Command.

In command, G/C. J. N. W. Farmer, D.F.C., has gone to Acklington, G/C. G. P. Seymour-Price, D.F.C., to Moreton-in-Marsh, G/C. J. Cherrill to Central Signals Area and W/C. D. A. Garner, D.S.O., to Molesworth.

For air staff duties G/C. A. V. R. Johnstone is appointed to No. 12 Group, W/C. D. L. Norris-Smith to Central Fighter Establishment, W/C. A. F. Binks, D.F.C., to Air H.Q. Malaya, W/C. G. F. E. Loveridge to No. 19 Group, W/C. J. A. Leathart, D.S.O., to H.Q. Northern Sector, W/C. D. A. Pocock to 2nd T.A.F. and W/C. E. F. J. O'Doire, D.F.C., A.F.C., to Coastal Command.

For technical staff duties W/C. W. A. Jones has gone to M.E.A.F. and W/C. J. R. Moir to Bomber Command.

Staff appointments include those of G/C.s E. L. G. Le Dieu, C.B.E., and T. F. Maloney, who have both gone to AAFCE and W/C. R. W. Hase to Allied Forces Mediterranean. W/C. C. F. Counter, D.F.C., is now at Leconfield for flying duties.

The following appointments are in the department of the Chief of the Air Staff: W/C. S. C. Ladyman, W/C. J. M. Rowe and W/C. W. R. Sadler. In the department of the Air Member for Supply and Organization are W/C. J. Williams, O.B.E., W/C. E. G. Davies, W/C. E. T. Tucker and W/C. H. H. B. Lewis.

G/C. H. R. Withers, O.B.E., is now in the department of the Air Member for Personnel. S/L. I. L. S. Chatfield, with the acting rank of wing commander, has gone to the Ministry of Supply.

Two R.A.F. Regiment appointments are: W/C. E. B. Colson, D.S.O., to command No. 16 Wing and W/C. J. T. O'Sullivan to No. 55 (L.A.A.) Wing.

Half-yearly Promotions

CONTINUED below is the list of half-yearly promotions announced by the Air Ministry. Other names from the list appeared in *Flight*, January 8th and 15th.

GENERAL DUTIES BRANCH: *Flight Lieutenant to Squadron Leader.*—B. H. Reece, A.F.C.; D. W. Bedford; W. J. S. Sutherland; E. L. Wallane; L. G. Raymond, M.B.E.; G. Bates, D.F.C.; C. R. Turner, A.F.C.; D. F. Miller, D.F.C.; A. E. Hall, A.F.C.; C. L. Godwin; C. P. H. Kunkler; G. J. Storey; G. W. W. Waddington, D.F.C.; D. F. C. Ross; W. G. Abel.

TECHNICAL BRANCH. *Wing Commander to Group Captain.*—J. R. MacLachlan, B.Sc.(Eng.), A.F.R.Ae.S.; J. B. Altham, B.A.; R. J. Rackham, M.A., A.M.I.C.E., A.M.I. Mech.E., A.F.R.Ae.S., D.C.Ae.; A. G. P. Brightmore. *Squadron Leader to Wing Commander.*—V. M. Montanini; C. W. Crimmin, M.B.E.; G. F. E. Loveridge; E. T. Tucker; W. T. Harrington, O.B.E.; D. E. Gibbs, M.B.E.; F. G. Toone; W. A. Jones; H. R. Free, O.B.E.; F. G. Hoad; T. L. Davies, M.B.E.; E. B. Loftus; E. B. Symonds; S. J. Davies, M.B.E., G.M.; R. F. H. Pamsay; C. E. Fooks; L. C. N. Penney; A. D. Balmain; H. J. R. Hailstone, O.B.E.; I. Roberts; A. D. Adams; J. T. Arklay, B.Sc.; G. H. Lambert, M.B.E.

Flight Lieutenant to Squadron Leader.—A. L. Baker (sen. 1st Jan., 1953); A. G. Ayre; K. M. Dunsford, A.M.I.E.E.; C. W. Fletcher; R. W. G. Ranner; E. A. T. Mack; J. D. Crawford, B.Sc.(Eng.); R. L. Cater; W. Roberts; A. Mercer; W. S. E. Allen, M.B.E.; G. N. W. MacFarlane; D. H. C. Nixon, M.B.E.; L. W. Gayler; W. G. Hales, M.B.E.; W. V. Reynolds; G. T. Hands; C. E. F. Brown, A.F.R.Ae.S.; J. Staff-Brett; P. R. Taylor; F. J. G. Cooper; A. F. Hindell; R. A. Ruane, A.F.M.; B. Webster; G. J. Clement; D. L. Wood, B.Sc.; M. G. Fountain; J. S. W. Jackson; J. Elliott; D. A. Flint; S. J. Lidstone; A. E. Mayhew; P. L. Kelly, B.E.M.; W. D. Reid, M.B.E.; I. Whittaker, D.F.C.; R. G. Little; O. B. Parker; J. W. Buttery; F. G. Dummer; A. E. Foster, A.F.R.Ae.S.; K. O. Lockyear, A.F.R.Ae.S.; F. A. Tonkin; P. Cadman, A.M.I.Mech.E., A.F.R.Ae.S.; D.C.Ae.; G. S. Gee; I. T. A. Murchie, A.F.R.Ae.S.; R. Morris, M.A., A.M.E.E., Dip.El.; A. C. Needham; A. G. Rodd, A.F.R.Ae.S.; R. Dimberline, A.F.R.Ae.S.; C. F. S. Churcher; R. Stone; E. H. Jenkins, A.F.R.Ae.S.; G. W. E. Woolley, D.F.C.; J. A. F. Morgan; T. W. Harper; A. T. Vacquier; J. T. Scanlon; D. M. Halliday; J. J. Clancy; A. H. D. Johnson; H. C. Taylor; R. S. Voyle; R. D. Roberts; C. G. Weeks; A. W. Hannaford; L. W. J. Cousins; T. H. Hignett, M.B.E.; C. W. Jefford; J. G. Tolley; A. B. Ellender; J. Duckworth, M.B.E.; F. Fazey; L. R. Old; R. Douglas; J. Lee, L. S. Bates, B.E.M.; O. Cromwell; R. H. Syrett; I. W. Thomas, B.E.M.; F. H. P. Lewer; J. W. Berry; A. May; J. Tocher; J. A. G. Beadle; D. G. Beal; H. S. Hallet; W. E. B. Hurst; J. A. Jones; C. J. Turner, M.B.E.; C. J. H. Meyers; D. J. Bolter; H. J. Moule, B.E.M.; W. T. Glazier; E. R. Maynard; S. I. Hardcastle, D.F.C.; H. A. J. Mills; J. Cockshoot; G. A. Crabb; F. V. Armstrong, M.B.E.; S. H. Mitchinson, D.F.M.; S. L. Gordon, L. E. Davies, M.B.E.

EQUIPMENT, SECRETARIAL and EDUCATION BRANCHES. *Wing Commander to Group Captain.*—L. A. Jackson, C.B.E.; A. B. Holloway, O.B.E.; O. M. Berkeley, O.B.E.; E. F. Wain, O.B.E.; A. Gollan, O.B.E.; W. K. LeMay, C.B.E.; D. G. O'Shea, B.A. *Squadron Leader to Wing Commander.*—D. W. T. Withers, A.F.C.; R. A. S. Ritchie; A. Mc.I. Peacock; H. R. Johns; A. B. Bishop; J. M. Howard; M. Keelan; H. E. Campbell-Orde; R. D. G. White; W. H. Bentley, O.B.E.; E. L. Brackenbury; P. H. Reason; J. E. S. Salter; F. E. Crosland; C. T. W. Morgan; W. A. Covill; D. A. Birkett; R. A. Webster; R. P. Breen; M. M. Gardham; T. E. J. Hewitt, B.Sc.

Flight Lieutenant to Squadron Leader.—C. D. Sorrie; A. J. D. Mackintosh; W. H. T. Woon, B.E.M.; L. Bannister; T. Crow; G. H. Jarrett, M.B.E.; G. P. Barry; J. F. H. Scott; D. E. Spencer; A. F. P. Beard; H. B. Pashley; L. G. Ayres; S. M. Righton; N. Allatson; W. A. Plowman; E. E. Harding; W. J. Parham, M.B.E.; R. C. L. Parkhouse; R. T. Mason; G. G. Thompson, D.F.M.; N. J. C. Pollock.

(To be concluded)

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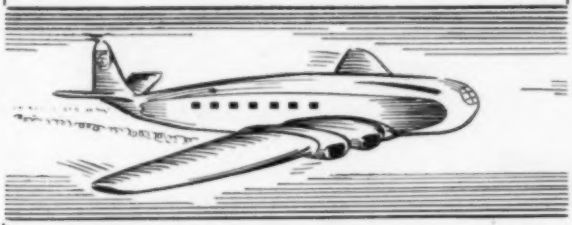

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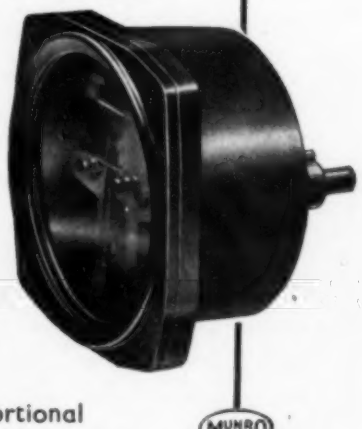

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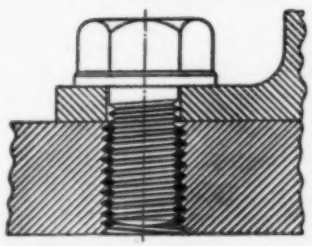

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PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

From Hunting-Clan Air Transport, Ltd., of 5 Fitzhardinge Street, London, W.1:

Applications Nos. 203, 204 and 205 to operate, with Avro York and later with DC4 aircraft, for a period of 10 years from the date of approval and at varying frequencies, all-freight services for the carriage of freight only between one or more points in any or all of the following areas: United Kingdom, Malta, East Africa, West Africa, Central Africa and South Africa.

Application No. 234 from Airwork, Ltd., of 15 Chesterfield Street, London, W.1, for an all-freight service with Dakota, Hermes, York and/or Bristol 170 aircraft, for the carriage of freight and mail between London Airport and Mombasa, with intermediate traffic stops at Cairo, Wadi Halfa, Khartoum, Juba, Entebbe and Nairobi, at a frequency of from one to seven services weekly, during the period from March 1st, 1954, to February 28th, 1964.

Application No. 255 from Air Charter, Ltd., of 15 Great Cumberland Place, London, W.1, for a normal scheduled service, initially with Avro Tudor aircraft and later possibly with Canadair (C4) aircraft, for the carriage of passengers, supplementary freight and mail between London (Stansted) and Lagos, with intermediate traffic stops at Rabat and Accra, at a frequency of from one service weekly to one service daily, during the period from April 1st, 1954, to March 31st, 1964.

Application No. 256 from Hunting-Clan Air Transport, Ltd., of 5 Fitzhardinge Street, London, W.1, for an inclusive tour service with Viking aircraft for the carriage of passengers between London (Bovingdon) and Lourdes (Ossun/Tarbes) at a frequency of one service weekly, during the period from May 10th, 1954, to September 17th, 1954.

Application No. 254 (amended) from Lancashire Aircraft Corporation, Ltd., of 7 Berkeley Street, London, W.1, for a seasonal inclusive tour service with Dakota aircraft for the carriage of passengers and supplementary freight between London (Blackbushe) and Valencia (Manises) at a frequency of one service weekly during the season from June to September inclusive, for a period of seven years, commencing June 1st, 1954.

Application No. 125/1 from the Central African Airways Corporation, of P.O. Box 1979, Salisbury, Southern Rhodesia, for amendments to the Colonial coach service which they are at present approved to operate between London and Lusaka, N'dola and Salisbury (Southern Rhodesia) via Malta and Nairobi to permit for the 12 months period commencing April 1st, 1954, an increase in frequency of up to two services weekly, and traffic rights between Nairobi or Dar-es-Salaam and London.

THESE applications will be considered by the Council under the terms of reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London, S.W.1, from whom further details of the applications and in particular of Applications Nos. 203, 204 and 205 may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections.

THE Council also give notice that the following application has now been withdrawn:—

Application No. 241 from Olley Air Service, Ltd., of Croydon Airport, Surrey, for a U.K. internal service between London (Croydon) and Birmingham (Castle Bromwich) for the period of the British Industries Fair, 1954, with D.H. Dove, D.H.89 and Consul aircraft, which was advertised in "The Times," "The Aeroplane" and "Flight" on January 1st, 1954. [1544

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b) Technical artists are also required for this Department, and although candidates who have some technical illustrating experience are preferred, this requirement is not essential.

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A. V. ROE AND CO., Ltd., have the following vacancies in their newly-formed electronics laboratory:

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AIRWORK GENERAL TRADING Co., Ltd., require aircraft engine and airframe fitters for maintenance of Viking and Hermes aircraft.—Apply, in person or by writing, to the Service Manager, Blackbushe Airport, nr. Camberley, Surrey. [1498
AERONAUTICAL and light engineers require one or two senior representatives who are well-known to leading aircraft manufacturers and general engineering organizations.—Write full details to Box 2677. [1499
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SENIOR and intermediate design draughtsmen with good experience of aircraft or light structural or mechanical engineering, required for aircraft and armament project work.—Apply, by letter, to Portsmouth Aviation, Ltd., The Airport, Portsmouth. [0612
TEST engineers or technical assistants required for development of refuelling in flight and pressure fuelling equipment. H.N.C. or equivalent.—Apply, in writing, to Personnel Manager, Flight Refuelling, Ltd., Tarrant Rushton Aircraft, nr. Blandford, Dorset. [1485
LATHE operator required for specialized and individual work at Blackbushe Airport. Salary according qualifications.—Apply Chief Engineer, Eagle Aircraft Services, Ltd., Blackbushe Airport, Camberley, Surrey. Tel.: Yateley 2371. [1537
AIRCRAFT or mechanical draughtsmen, all graded and junior aircraft stress and weightsmen required. —Apply, stating age, experience and salary required, to the Chief Draughtsman, Alan Muntz and Co., Ltd., Aircraft Division, Langley Aerodrome, Slough, Bucks. [0368
ARMSTRONG SIDDELEY MOTORS require technical assistants for work on rocket motors. Candidates should have a degree in mechanical engineering or general science.—Apply, in writing, quoting Ref. DH5, Personnel Manager, Armstrong Siddeley Motors, Coventry. [1533
TWO intermediate design draughtsmen required with experience on mechanical and precision engineering for development work. Pleasant working conditions. Five-day week.—Apply, in writing, to Personnel Manager, Flight Refuelling, Ltd., Tarrant Rushton Airfield, nr. Blandford, Dorset. [1534
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ARMSTRONG SIDDELEY MOTORS require an electronic engineer to assist in the building and development of equipment for testing rocket motors. Applicants should have Higher National Certificate or degree in physics or electrical engineering.—Write, giving full details, to Ref. DH4, Personnel Manager, Armstrong Siddeley Motors, Coventry. [1532

EXPERIENCED technical illustrator required for Publications Department of British Messier, Ltd., Cheltenham Road, Gloucester. Staff pension and assurance scheme, welfare and sports facilities, and single accommodation available.—Reply, giving fullest details of experience, stating age, to the Personnel Manager. [1518

HANDLEY PAGE (Reading), Ltd., The Aerodrome, Woodley, Reading, have vacancies in their Design Office for senior and intermediate stressmen and for senior, intermediate and junior weightsmen. They are required for work on an interesting new project with good opportunities for advancement.—Please send full particulars of experience, etc., to the Personnel Officer. [0235

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AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd., Luton Airport, Beds. Applications are invited from senior and junior draughtsmen and stressmen for work on this interesting programme. Good welfare facilities, including staff pension scheme.—Write, giving details of experience and salary required, to Personnel Manager. [0595

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ARMSTRONG SIDDELEY MOTORS require a technical assistant for experimental work on aero engines (gas turbine) in particular, flight analysis, performance and development. Applicant should possess degree or equivalent and preferably have completed National Service.—Apply, in writing, with full details to Personnel Manager, Armstrong Siddeley Motors, Coventry. [1488

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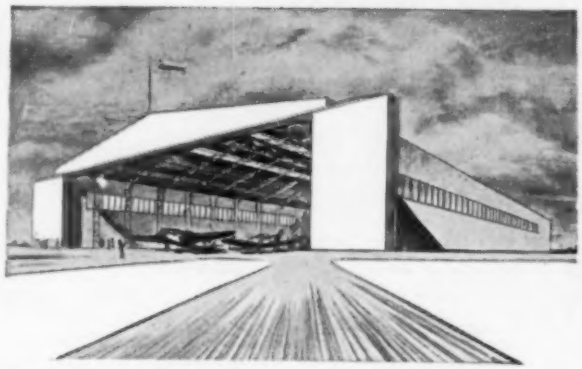

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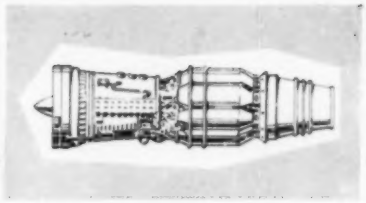

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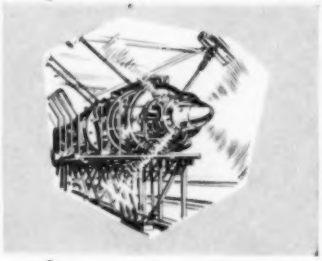

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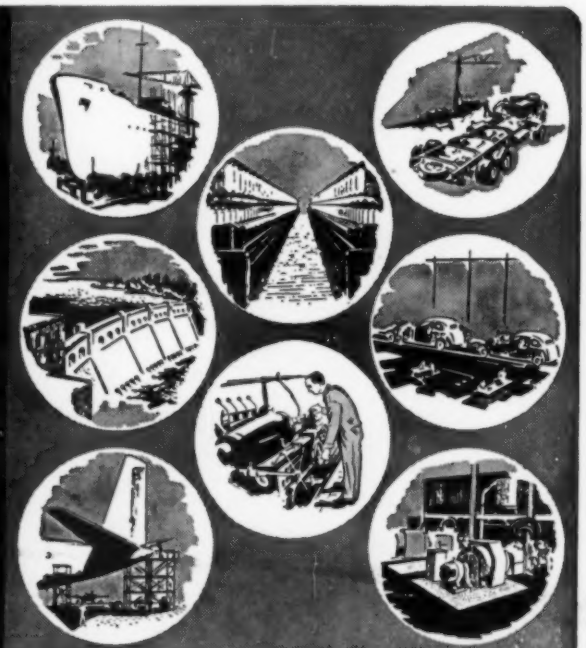

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